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ADDRESSES AND ORIGINAL ARTICLES

SEVERE HÆMORRHAGE FROM THE STOMACH AND DUODENUM

By T. Izod Bennett, M.D., F.R.C.P.
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PROFESSOR OF PHYSIOLOGY, MIDDLESEX HOSPITAL

(*From the Courtauld Research Wards, Middlesex Hospital*)

CRITERIA OF SEVERITY

PRELIMINARY CONSIDERATIONS*

In March, 1935, two of us (T. I. B. and S. W.) began an inquiry into gastric and duodenal hæmorrhage, which has now been in progress for over three years. The chief purpose of the investigation was to obtain accurate information about the prognosis, the cause of death (when it occurred), and the best methods of treatment in cases of dangerous bleeding from the stomach and duodenum. The other two writers have, at various times, had complete responsibility for the observations on the blood volume, and this paper represents the combined work of all four observers.

The literature dealing with hæmorrhage from the stomach and duodenum is enormous and the conclusions reached are notoriously conflicting. Much of the prevailing difference of opinion is due to the fact that the cases recorded by different workers have not been of a similar degree of severity. Reports on long series of cases have been published in which the sole criterion for admission into the series has been that hæmorrhage of some degree has occurred. Other series, on critical examination, appear to include only severe cases; others again have been limited to mild cases; while many have been heterogeneous in character. It is impossible that identical conclusions about prognosis and treatment can emerge from studies of such varied material.

At the outset of this inquiry it was decided to limit our observations to severe cases; the question of definition at once arose. Instructions were given that only such cases should be admitted as appeared, on clinical grounds, to be suffering from hæmorrhage of a degree which endangered life. Subsequent examinations and the further progress of the case sometimes showed that this initial standard for admission was subject to error; a certain number of cases were revealed as relatively mild. Occasionally, too, a case which appeared to be slight developed recurrent and more severe hæmorrhage and passed into the category which includes the gravest cases.

In this first communication our chief purpose is to focus attention on the fact that the classification of cases into groups of different degrees of severity is not only a source of conflicting conclusions but is in itself an extremely difficult problem. The severity of any case can only be judged when it is known: first, how much blood has been lost; and, secondly, whether bleeding has ceased, temporarily or permanently.

CLINICAL CRITERIA OF SEVERITY OF HÆMORRHAGE

A patient may be deemed to have had a dangerous hæmorrhage:

(*a*) When there is a convincing history of the vomiting of a pint or more of blood or the passage of a large quantity of bright or changed blood per rectum.

(*b*) When the patient, without obvious evidence of vomiting or passage per rectum of blood, has collapsed, showing clinical signs of severe hæmorrhage such as high pulse-rate, a fall in blood pressure, and, in more severe cases, a fainting attack or air-hunger.

The hæmorrhage will be diagnosed as arising from the upper alimentary canal if the patient is known to be suffering from chronic peptic ulcer or has a history suggestive of such a condition, or, occasionally, when it seems the most likely diagnosis on general grounds.

From such criteria it may reasonably be assumed that a patient is suffering from dangerous hæmorrhage, but no more refined assessment can be made of the severity of his state without data given by more precise observation. Such data are of extreme importance because the choice of treatment in each individual case must largely depend upon its severity. The need for blood transfusion or even, in rare cases, surgery, can only be determined when the exact extent and rate of the blood loss is known, and this can only be discovered by estimation of the total volume of the blood.

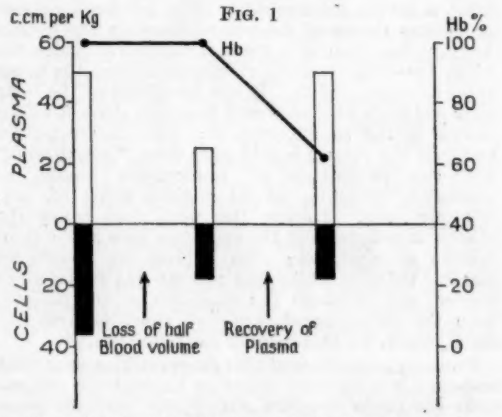


FIG. 1

To illustrate how the fall in hæmoglobin percentage following hæmorrhage is dependent on restoration of plasma volume.

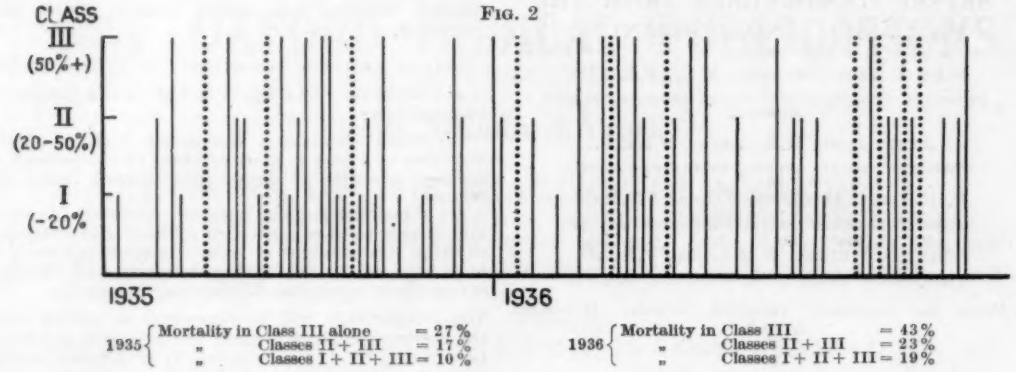
The ancillary observation on which reliance is often placed is estimation of the percentage of hæmoglobin in the blood. It is true that in any given patient knowledge that the percentage of hæmoglobin is falling hour by hour, or day by day, is usually evidence that hæmorrhage is continuing; but such an estimation of the percentage of hæmoglobin leaves the critical observer in doubt as to whether any deficiency present represents the result of recent hæmorrhage, of prolonged hæmorrhage, or of hæmorrhage which is still in progress, or even whether it may not in part be due to anæmia resulting from causes other than actual bleeding.

Hæmorrhage occurs at the expense of both plasma

*Communications dealing with ætiology, prognosis, and treatment will appear later.

SCHEMA OF ALL CASES ADMITTED TO THE RESEARCH UNIT 1935–38, SET OUT CHRONOLOGICALLY AND CLASSIFIED ACCORDING TO SEVERITY (*see also continuation below*)

FIG. 2



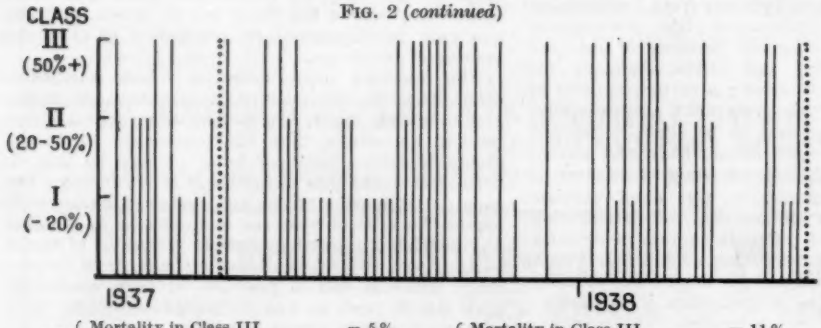
1935 { Mortality in Class III alone = 27%; " Classes II + III = 17%; " Classes I + II + III = 10%

1936 { Mortality in Class III = 43%; " Classes II + III = 23%; " Classes I + II + III = 19%

and corpuscles, but whereas the body restores the lost plasma with considerable rapidity it can only restore the corpuscles by a process of regeneration occupying weeks of time. In Fig. 1 is shown diagrammatically the state of affairs immediately after a severe hæmorrhage. The left-hand column represents the total amount of blood in the normal body in the form of a vertical column of which the lower two-fifths consists of corpuscles and the upper three-fifths of plasma. If half the blood of the body were suddenly lost we would have the state of affairs shown in the second column: half the corpuscles and half the plasma would have been "amputated," but the percentage of hæmoglobin would be unaltered, remaining at its original figure of, say, 100 per cent. During the next few hours the plasma is restored and the condition seen in the third column is produced; the volume of corpuscles remains reduced whilst the plasma has returned to normal, and, although the condition of the patient, from the physiological point of view, is probably much better, his hæmoglobin has fallen sharply.

From consideration of this diagram it is clear that assessments of severity based on hæmoglobin estimations are liable to grave fallacy and that the error is liable to be greatest at moments of extreme importance—i.e., in the hours immediately following a severe hæmorrhage. It further emerges that the only way of obtaining data of reliability is to employ some method which estimates the total volume of the blood plasma and the total volume of the blood corpuscles.

FIG. 2 (*continued*)



1937 { Mortality in Class III = 5%; " Classes II + III = 3%; " Classes I + II + III = 2%

1938 { Mortality in Class III = 11%; " Classes II + III = 8%; " Classes I + II + III = 6%

DETERMINATION OF TOTAL BLOOD VOLUME

The method we have employed for the estimation of the blood volume is the dye method of Keith, Rowntree, and Geraghty (1915) which depends upon the introduction into the circulation of a known amount of a non-toxic dye. This dye remains in the circulation long enough to become thoroughly mixed with the plasma and its concentration is measured colorimetrically. From the extent of dilution the plasma volume may be calculated; the total volume of cells is estimated by calculation from this in conjunction with the use of the hæmatocrit. Following the work of Rowntree and Brown (1929), a number of minor modifications in technique have been introduced, and some of these will be described in detail.

Congo red is the dye of choice. Vital red is unsuitable as it is eliminated with great rapidity. Care taken in the preparation of the Congo-red solution suffices to prevent reported ill effects such as rigors. Douglas and Priestley (1924) have condemned the method for this reason. We have found that with proper precautions no unpleasant reactions occur.

Preparation of Congo-red solution. — 500 mg. Congo red are dissolved in 25 c.cm. of saline specially prepared with doubly distilled water. The dye solution is heated to boiling and filtered hot. Distilled water is washed through the filter paper to carry more dye into the solution. The filtrate is then boiled for ten minutes to ensure sterilisation and the volume restored to 25 c.cm. by the addition of sterile distilled water. The dye solution must be freshly prepared for each case and not allowed to stand more than a few minutes.

Technique.—Subjects should preferably be examined fasting in order to avoid cloudiness of the plasma, which often occurs even after an apparently fat-free meal. 5 c.cm. of blood are first withdrawn from an arm vein and placed in a centrifuge tube containing 1 c.cm. of a 1·6 per cent. solution of

sodium oxalate; this is inverted several times to mix thoroughly. 10–15 c.cm. of the Congo-red solution are then injected into the same vein. The amount injected varies with the weight of the individual, 1 c.cm. per 5 kg. body-weight being the dose employed.

If the syringe is now detached from the needle some drops of fluid will escape containing an appreciable amount of dye. To deal with this danger, and also to wash out the small amounts of dye left behind in the syringe, the following procedure was originally adopted. After emptying the syringe and without detaching it from the needle, 2 c.cm. of blood were withdrawn, the syringe and its contents rotated and the contents reinjected. This procedure was repeated a second time. The syringe was then detached from the needle and filled with the specially prepared saline solution, which was injected into the vein. Latterly this difficulty has been avoided by using a syringe which is calibrated to deliver accurately the amount stated on the barrel.

Four minutes later 5 c.cm. of blood are withdrawn from a vein in the opposite arm and this sample placed in a second similarly prepared centrifuge tube.

The blood samples are then centrifuged at 3500 r.p.m. until the corpuscular sediment is of constant volume.

It is important to be able to obtain identical corpuscular sediment readings in the different samples. A series of experiments was carried out on this point and it was found that the most important factor is the use of a dry syringe. A wet syringe contains a varying amount of fluid, which may be as much as 0·5 c.cm., and the presence of this fluid will alter considerably the plasma-corpuscular ratio especially when small amounts of blood are being used. In our experience, contrary to the observations of other workers, occlusion of the veins of the arm makes no difference to the plasma-corpuscular ratio as long as a dry syringe is used. In spite of this finding, occlusion was never employed in our series.

Two solutions are now prepared for colorimetric comparison. One, the standard, contains 4 c.cm. saline, 2 c.cm. plasma from the blood drawn before the injection of the dye, and 2 c.cm. 1/250 dilution of the dye injected. The other contains 6 c.cm. saline and 2 c.cm. of the plasma stained with dye. These solutions are compared in a Dubosc colorimeter and a ratio inversely proportional to their relative concentrations is found. The volume of the plasma is calculated by multiplying the volume of dye injected by 250 (dilution of dye in colorimeter) and by the colorimetric ratio. The final formula for calculation of the plasma volume (Vp) therefore reads:—

$$Vp = 10 \times 250 \times \frac{C_x}{C_s} \times A$$

where 10 = 10 c.cm. of injected dye.
250 = dilution factor.
C_x = colorimeter reading of unknown solution.
C_s = " " standard solution.
A = amount of plasma in each c.cm. of blood-oxalate mixture.

FATE OF CONGO RED IN CIRCULATION

It is found that Congo red disappears gradually from the plasma at a rate that is fairly constant in normal subjects. At the end of twenty minutes upwards of 86 per cent. of the dye is still in the circulation, and at the end of one hour 70 per cent. is still present. These figures have been calculated by comparison with the four-minute sample which was taken to represent 100 per cent.

In certain pathological states, notably amyloid disease, the dye rapidly disappears. In a series of cases of suspected amyloid disease tested, all of which showed enlargement of the spleen, less than 10 per cent. of the dye was found in the circulation at the end of one hour. No opportunity has yet occurred however to confirm the provisional diagnosis pathologically. Benhold (1923) has suggested that this rapid elimination of the dye might be employed as a test for the presence of amyloid disease, and these observations support his contentions.

In view of these findings it is advisable when investigating the blood volume in cases of hæmorrhage suspected of having amyloid disease to determine first, as a precautionary measure, the rate of excretion of the dye from the blood.

BLOOD AND PLASMA VOLUME IN NORMAL SUBJECTS

We have examined 23 normal males, several of them on more than one occasion. The results of these investigations are closely comparable with the figures presented in Rowntree and Brown's monograph (1929). Statistical analysis of our results by our colleague Mr. W. F. Floyd, B.Sc., showed no significant difference between the results obtained in this inquiry and those of the American authors both as regards the absolute figures for total blood and plasma volumes and the volumes expressed per kilogramme of body-weight.

In the original report of Keith, Rowntree, and Geraghty (1915), plasma volumes in 18 normal subjects varied from 43 to 54 c.cm. per kg. with an average of 50 c.cm. The total blood volume varied from 78·5 to 99 c.cm. per kg. with an average of 85 c.cm. Our results are in close accord with these.

Figures of total blood volume vary in proportion to body-weight and surface area. The latter relation is the more accurate, but is almost impossible to obtain from a patient who is ill. Figures giving the total plasma volume (Vp) and the total cell volume (Vc) for a large man will naturally be higher than those for a small man, whilst those for a short, fat individual will be much larger than those for a short, lean individual. In a series such as the present satisfactory comparison between cases could not be made if absolute figures were given. We have employed figures giving cell and plasma volumes expressed in cubic centimetres per kilogramme of body-weight, this being the practical reading least liable to variation.

RELIABILITY OF CONGO-RED METHOD

Since its introduction this method has been subjected to many criticisms. It has been suggested that dye may be adsorbed by red blood-cells; that Congo red is an indicator; that thorough mixing may not take place before absorption begins; and that accuracy is difficult in the use of a simple colorimeter (Lindhard 1926). Arguments may be advanced on both sides of each of these questions (Rowntree and Brown 1929), but it is simpler on the whole to apply direct approach to the problem.

Accuracy has been tested during the present investigation by two controlled experiments. In the first a patient was bled a measured quantity of blood. The cell volume was calculated before and after the operation and the figures were as follows:—

LOSS OF 600 C.CM. BLOOD WITH HÆMATOCRIT OF 42% C.CM.

Vc before bleeding (c.cm.).	Vc after bleeding (c.cm.).	Actual loss (c.cm.).	Loss in theory (c.cm.).
1550	1300	250	250

In the second, many patients known not to be bleeding have had blood volume estimations carried

out before and after transfusion. The results of this experiment are seen below :—

Vc before dbt. (c.cm.).	Vc after dbt. (c.cm.).	Cells added (c.cm.).	Rise in Vc (c.cm.).
600	2000	1400	1400
400	1200	1000	800
900	2400	1400	1500
900	1400	400	500
700	1500	800	800
350	700	350	350
500	1100	550	600
600	1200	600	600

dbt. = drip blood transfusion.

These results demonstrate that the dye method is reasonably accurate. It must be pointed out that it is useless to estimate the increase in plasma volume as a test of the reliability of the method, because during and after transfusion the surplus plasma is eliminated in varying amounts from the circulation. The calculated addition of cells, however, satisfactorily serves the purpose, as in the period under consideration only an insignificant proportion of circulating red cells is destroyed. Though the cell volume is not estimated directly by the dye method it is calculated from the plasma volume and the hæmatocrit readings, and therefore any error in the determination of the plasma volume is reflected in the cell volume.

The successful use of this method demands skill and experience in the use of the colorimeter. The crimson tint in the plasma produced by Congo red is notoriously difficult to match; this potential error is minimised by the use of an Ilford "blue-green" filter. Recently a method of blood volume determination with a blue dye (T.1824) has been introduced by Gibson and Evans (1937). Kennedy and Millikan (1938) have modified the technique, the colorimetric comparison being carried out by means of a photo-electric cell galvanometer. We have not yet been able to give this method adequate trial.

A SURVEY OF THE PRESENT SERIES

It has been suggested in earlier paragraphs that the severity of any case in which bleeding has occurred from the stomach and duodenum can only be assessed when it is known how much blood has been lost and whether bleeding has ceased. The first of these postulates is emphasised by a brief survey of the cases of hæmorrhage observed by us.

Fig. 2 shows all the cases of hæmatemesis *from all causes* admitted to our care in chronological order, the severity of the case being indicated by the height of the vertical line. Cases with a fatal outcome are indicated by dotted lines. The series, up to date, comprises 122 admissions, including several cases which have been readmitted once or even twice. The cases were divided into three groups according to the lowest blood volume figures obtained during their stay in hospital. Class I (slight) had lost less than 20 per cent. of their normal cell volume; Class II (moderate) lost 20–50 per cent.; and Class III (severe) lost over 50 per cent. Thirty-three are classified as slight, 32 as moderate, and 57 as severe. All, as indicated in an earlier section, were admitted because it was believed that life was endangered by the hæmorrhage. But blood volume examinations revealed that in 33 cases the amount of blood lost did not amount to more than one-fifth of the total blood volume whilst in 32 it was not more than one-half. That the estimation of blood volume is a genuine criterion of severity is indicated by the fact that the fatal cases were confined to the group in whom the blood volume was notably reduced. It is to be noted that it is the fraction of the total blood volume consisting of the cells which is the all-important one. We have already indicated, in Fig. 1, how, in theory, immediately after a very rapid and severe hæmorrhage, an amputation of a section of the total blood occurs leaving the relative amounts of plasma and cells momentarily unchanged. Plasma volume and total cell volume are reduced by an equal fraction of the whole, the percentage of hæmoglobin remaining unchanged. Fluid then passes into the blood from the tissue spaces to restore the plasma volume. In the majority of our cases (including the severe ones) the plasma volume had completely recovered by the time determinations of the blood volume were made, which was usually a few hours after hæmorrhage had occurred. In some, however, it was not restored 6–24 hours later. In this latter group the hæmoglobin percentage obviously falls progressively throughout the period of plasma restoration, and until that has been completed the hæmoglobin percentage gives a misleadingly optimistic indication of the blood loss.

This fallacy is accentuated in cases where a further hæmorrhage takes place after a period of treatment in which the fluid intake is low. In one of our cases recurrent hæmorrhage reduced the cell volume to a quarter of its original value whilst the hæmoglobin remained at 54 per cent. Had the hæmoglobin estimation been the only information available the true state of the patient would not have been appreciated.

We have constantly observed that when the plasma volume is fully restored the total blood volume is still subnormal because full cell recovery has not yet occurred. It has been stated by other

FIG. 3

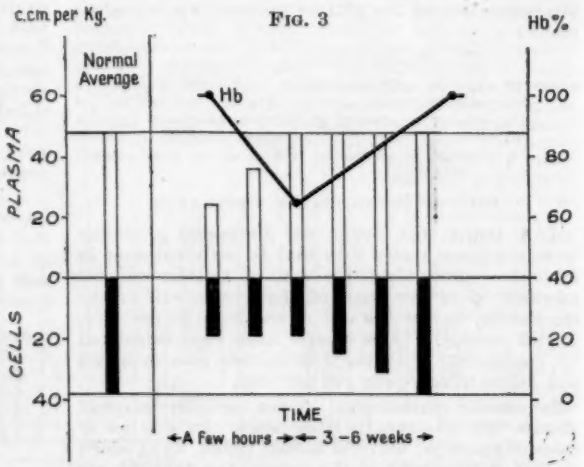


Diagram to illustrate restoration of plasma volume after single severe hæmorrhage, with slow restoration of cell volume during subsequent weeks and consequent effects on hæmoglobin percentage.

observers (Robertson and Bock 1919, Robertson 1935, Keith 1919) that the total blood volume may be rapidly restored after hæmorrhage, implying that the plasma volume may increase above normal to compensate for the cell loss. This, in our experience, is not so. We find that in uncomplicated cases the total blood volume returns only as the lost cells are slowly regenerated (Fig. 3).

Even when the plasma volume is fully restored the hæmoglobin percentage does not give an accurate measure of the blood lost. This can be illustrated by an example. Let us imagine that 100 c.cm. of blood initially contained 60 c.cm. plasma and 40 c.cm. cells—i.e., hæmatocrit reading 40 per cent. Half the cells are lost and the plasma volume is restored. The blood now contains 60 c.cm. plasma to 20 c.cm. cells. The hæmatocrit reading is 25 per cent. —i.e., 62 per cent. and not 50 per cent. of the original. Similarly, if the original hæmoglobin was 100 per cent. after loss of half the cells, the hæmoglobin would be lowered not to 50 per cent. but to 62 per cent. It is obvious that neither of the sources of error to which attention has been drawn enter into the blood volume data which give an absolute (and not a relative) measurement of the total volume of red cells in the circulation.

FIG. 4

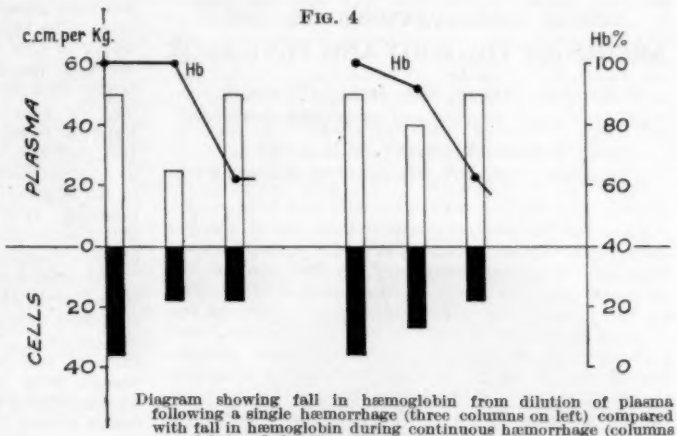


Diagram showing fall in hæmoglobin from dilution of plasma following a single hæmorrhage (three columns on left) compared with fall in hæmoglobin during continuous hæmorrhage (columns on right). Only the estimation of cell volume demonstrates continuation of hæmorrhage.

CRITERIA OF CESSATION OF HÆMORRHAGE

We are now faced with our second postulate, that in order to judge the severity of a case it must be known whether bleeding has ceased or not. It has been demonstrated in the preceding section that dilution of the blood by reconstitution of the plasma is the factor which brings about the fall in the hæmoglobin percentage following hæmorrhage, and that the varying speed at which this may be accomplished may give rise to a serious error if the hæmoglobin percentage is accepted as a guide to the extent of hæmorrhage; the same process creates a still graver source of error if the hæmoglobin percentage is accepted as a guide as to whether hæmorrhage has ceased or not. For it is clear that in the hours after hæmorrhage has begun the hæmoglobin percentage must be expected to continue to fall for some time whether the actual hæmorrhage has ceased or not. Here again observation of the total blood volume is the only certain guide available. Fig. 4 illustrates this: the three columns on the left show the course of events after a single but rapidly arrested hæmorrhage, whilst the three columns on the right show the state of affairs when hæmorrhage is continuing simultaneously with the process of dilution. Though it is true that if hæmorrhage is continuing the fall of hæmoglobin may be greater than if it has been arrested this need not necessarily be so, owing to the variation in the intensity of the bleeding from case to case. The one fact which points inevitably to the conclusion that bleeding is still in progress is that the cell volume has diminished in the second case whereas it remains unchanged in the first.

At this point we may remark that surgical intervention during the acute stages of hæmatemesis and melæna is almost always carried out on the assumption that bleeding is still in progress. There is, we believe, no clinical criterion which gives any firm basis for such an assumption; estimation of the blood volume alone gives this important information.

When transfusion is employed it is clear that the situation becomes extremely complicated; plasma and cells are being artificially added to the circulation, and it becomes difficult to interpret blood volume or hæmoglobin figures which result from such complex factors as blood loss, physiological plasma restoration, and the artificial addition of plasma and cells when these three processes are going on at different speeds which can often only be guessed at. In such circumstances hæmoglobin figures alone are usually of such obscurity as to be worthless. This subject will be dealt with in greater detail in a later communication.

SUMMARY

For more than three years an inquiry into severe hæmorrhage from the stomach and duodenum from all causes has been in progress in the Courtauld research wards of the Middlesex Hospital. The 122 cases studied have been admitted on clinical criteria suggesting that life was endangered owing to hæmorrhage. It is suggested that the severity of any case can only be judged when it is known how much blood has been lost and whether bleeding has ceased; this information can only be obtained by determination of the blood volume. Details of the method, observations on normal persons, and experimental evidence of the accuracy of the method are given. Preliminary details of the cases investigated are quoted and the importance of the factors determining severity is stressed.

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SOME OBSERVATIONS ON THE ARCHES OF THE FOOT AND FLAT-FOOT

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FLAT-FOOT is generally regarded as one of the less inspiring and more commonplace of structural imperfections. If excuse is necessary, on that account, for re-examining such a well-worn subject, it is afforded by the atmosphere of confusion which pervades the surgical accounts of the arches of the feet, and especially by the constant repetition of an unsatisfactory terminology. For this the surgeon is largely to blame, for his outlook and clinical teaching on this subject have failed to keep pace with anatomical progress.

Current Teaching on Arches of the Foot

Conventional clinical teaching recognises three distinct arches in the foot. The *longitudinal arch* lies in the antero-posterior axis, and extends forwards from the posterior end of the calcaneum to the metatarsal heads. The *tarsal arch* is transverse; it is the arch formed by the two feet placed together with their medial borders in contact, and it extends from the cuboid of one foot to that of the other. Each foot, therefore, carries half of the transverse tarsal arch. The so-called *anterior metatarsal arch* is said to be formed by the metatarsal heads, so that it too is transverse. At its extremities are the first and the fifth metatarsal heads. According to this conception the foot is something in the nature of a tripod, the points of the tripod comprising the heel and the heads of the first and the fifth metatarsals; these together constitute its effective weight-bearing areas.

On the clinical side no diagnosis has been so overworked in the interpretation of painful feet as "flat-foot" or "fallen arches"; and two main brands of this catastrophe have been regularly taught to generations of students. In the first—the ordinary "flat-foot"—the longitudinal arch is obliterated; the second is a collapse of the arch across the metatarsal heads, and is known as anterior, or metatarsal, flat-foot. Some discussion of these types is relevant at this point.

ANTERIOR FLAT-FOOT

In this deformity the second, third, and fourth metatarsal heads are supposed to "drop" to the level of the first and fifth heads, and remain permanently in the same horizontal plane. In consequence, there is produced a form of pain in the ball of the toes which is commonly known as metatarsalgia and is generally attributed to nipping of the digital nerves between the displaced metatarsal heads and the ground.

Despite this apparently well-defined clinical concept, there is nevertheless considerable confusion about the anterior metatarsal arch. The authoritative anatomical text-books in this country do not refer to it at all. Frazer (1933) goes so far as to state that the lateral metatarsal heads are all in contact with the ground, and act as balancers in so far as they take only sufficient weight to keep the balance of the body on the ball of the great toe. This view has been even more strongly upheld by Morton (1937), who by an ingenious system of measurement has demonstrated that normally there is no anterior metatarsal arch.

It seems all the more strange that clinical literature has been slow to dispense with such a dubious structure. The three most authoritative orthopædic text-books in this country still cling to it, and so far as we can ascertain only Lake (1935) and Bankart (1935) dispute it. Lake believes that a slight arch may be present but that it has little significance; Bankart is emphatic in his denial of its existence. It is, perhaps, because pain in the foot is not a dramatic or a lethal disease that a definite and uniform account of its anatomy has not been absorbed into clinical teaching. It is our hope that the present observations will hasten the coördination between academic and clinical teaching.

The evidence for the presence of the anterior metatarsal arch appears, in the main, to consist of a supposed demonstration of it in certain cross-sections of the foot. These cross-sections appear in many surgical text-books and papers, but are noticeably absent from anatomical literature. Actually, the unequal distal projection of the individual metatarsal heads makes it quite impossible to cut a true cross-section through them, so that illustrations purporting to show the metatarsal arch are worthless. A more recent attempt by Farquharson (1936) to demonstrate the arch in an antero-posterior radiogram with the sole of the foot horizontal is hardly admissible as evidence, in view of the distorting effects of the rays and of the fact that the normal person, by the voluntary exercise of muscle power, can certainly elevate the intermediate metatarsal heads from the ground. There is thus virtually no acceptable evidence for the existence of an anterior metatarsal arch.

THE LONGITUDINAL ARCH

The longitudinal arch has to be regarded as a more definite structural entity. An element of confusion has arisen, however, from the observations of Bankart (1935) and Wiles (1933) who regard this arch as actually a "deformity" which owes its origin to the wearing of shoes. They hold that the normal foot should be quite flat, but mobile, so that an arch can be created by the action of the powerful muscles which play on the foot. When muscular activity is suspended the foot should again pass into a resting or relaxed phase in which it is quite flat. The action of footwear is so to restrict the range of movement at all the joints that the bones come to assume an intermediate position corresponding to the mid-position of the movement at the joints. This intermediate position corresponds to the longitudinal arch, which is therefore midway between the flat resting position and the highly concave position that the foot can be made to assume.

If this conception of Bankart's is a true one, it must be accepted as having revolutionary implications so far as treatment is concerned, for it means that attempts to restore or support a longitudinal arch are fundamentally irrational. This strikes at the very foundation of much orthopædic practice, and naturally the hypothesis has not gone without challenge. Lake in particular has pointed out that even under full anæsthesia the arch cannot be obliterated with the employment of considerable force, and he strongly supports the premise that the arch is a normal structural feature of the normal foot

Some of the confusion concerning the longitudinal arch has without doubt resulted from the fact that deformities of the arch are not invariably or necessarily associated with pain or other evidence of disability. It is because the whole question is obviously in an unsatisfactory position that we decided to study the architecture of the foot from the standpoint of development.

Arches of the Fœtal Foot

It is now agreed that the general form of a bone is defined in its cartilaginous precursor and that it is determined by inherent factors independent of external influences. However, the form of the growing bone—not only its external shape but its internal architecture—is influenced by the functional stresses to which it becomes habitually subjected. The influence of these external factors increases as the bone approaches maturity. The extent of the difference in form between the cartilaginous precursor and the mature bone varies in different bones and, as might be expected, is greatest in the weight-bearing bones. The bones of the foot, for example, undergo considerable changes in form in the early years of life as they become habituated to the bearing of body-weight; Weidenreich (1922) has described these changes in the calcaneum.

During the growth of different bones there are also changes in their relative lengths and in the relative sizes of different parts. In the foot there is during fœtal life a progressive diminution in the relative lengths of the forefoot and the tarsal foot. Even at birth, however, the forefoot is relatively about 6 per cent. longer than in the adult; the adult proportions are attained only when the child is fully adapted to walking and standing.

These general principles, it may be said, are fully exemplified in the skeleton of the foot and it is therefore of special interest to observe that by the end of the third month of fœtal life the foot is already arched in a manner closely resembling the arching of the normal adult foot (Walmsley 1938). It is to be noted that the modifications which the bones undergo in the later part of fœtal life and in infancy, and the changes which these modifications produce on the form of the arches, are imposed on a skeletal form which is primarily an arched one.

A wide range of fœtal material has been examined. Some observations were made on material in the embryological collection at Edinburgh University and others on a series of especially prepared fœtal feet. The smallest feet were from a fœtus of 40 mm. C-R length (10 weeks old) and the largest were the feet of full-time fœtuses. Serial sections of the smaller specimens were made in all three planes and dissections and occasional intermediate sections were made of the larger specimens. In this paper the arches of the intermediate-sized specimens are described, but they are similar in their general form throughout fœtal life.

TRANSVERSE METATARSAL ARCH

This arch has been studied in a series of coronal sections.

At the base of the metatarsals in a 52 mm. human fœtus (Fig. 1 *a*) there is a well-defined transverse arch. The arch appears to be dependent on the large size of the base of the first metatarsal and the fact that the dorsal surface of the base of the second metatarsal is on the same horizontal plane as the dorsal surface of the first: the dorsal surface of the lateral three metatarsals are nearly flush with one another but slope gradually downward in a lateral direction. The section illustrated is a little deceptive inasmuch as it is in the true coronal plane and therefore cuts the lateral metatarsals through the posterior parts of the bodies rather than through the bases; this is because the line of the tarso-metatarsal junction is an oblique one (both in the fœtus and in the adult) and slopes backwards as well as laterally from the medial side of the foot. The fourth and fifth metatarsals therefore appear smaller than if they had been cut through the bases. The same arched form and the same disproportion in size between the first metatarsal and the lateral four metatarsals are present in the full-time fœtus and in the adult. As the metatarsals pass forwards the transverse arch becomes less and less pronounced; the form of the arch at the junction of the proximal two-thirds and distal third of the first metatarsal in a 52 mm. human fœtus is shown in Fig. 1 *b*. This again is a true coronal section and therefore cuts the fifth metatarsal through its head. At this level there is a slight arch between the body of the first metatarsal and the head of the fifth, which disappears as the heads of the medial four metatarsals are approached (Fig. 1 *c*).

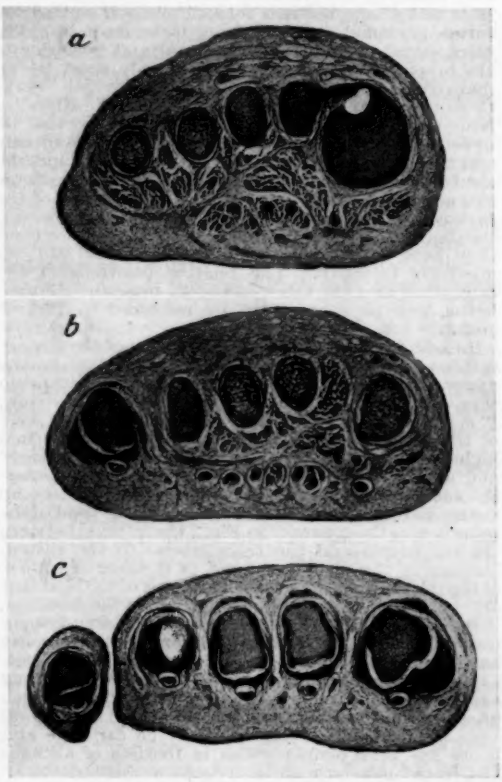

FIG. 1.—Transverse sections of the metatarsus of a 52 mm. human fœtus (*a*) through the bases of the metatarsals; (*b*) at the junction of the proximal 2/3 and distal 1/3 of the first metatarsal; and (*c*) through the heads of the medial four metatarsals and the first phalanx of the fifth toe. In each section the first metatarsal is on the right side of the page.

In Fig. 1 *c* the heads of the four metatarsals are approximately in the same horizontal plane; they are also in the same plane as the fifth metatarsal head which, however, is at a more posterior level. In interpreting transverse sections of the foot in the region of the metatarsal heads this difference in the antero-posterior position of the heads must be remembered, for an apparent arch due to this difference may be taken for a real one. The heads of the metatarsals have been found to be approximately horizontal in all the fœtal sections and the view that this is the condition in the adult cadaver has been verified.

Our observations on fœtal and adult feet are in keeping with the experimental results of Morton (1937) who has demonstrated by a three-platformed balance—the staticometer—that in normal stance the head of each metatarsal bears a part of the body-weight;

each of the lateral four metatarsal heads, he has shown, bears the same proportion of the body-weight and the first metatarsal head bears twice as much as each of them.

LONGITUDINAL ARCH

As stated above, the foot of the three-month-old fœtus has a longitudinally arched form that is comparable with that of the normal adult foot.

In the five- and six-week embryo, however, the precursors of the tarsal bones have an arrangement different from that of the older fœtus. The rudimentary talus, in the six-week embryo, lies between the tibia and fibula, but it is rotated on itself so that the future proximal (upper) surface looks medially. The calcaneum, at this stage, is lateral and posterior to the talus and is distal to the relatively short lateral malleolus. Between the fifth and eleventh weeks (5 mm.–52 mm. C-R length) the bones radically alter their position. The talus rotates on itself so that its upper surface comes to look almost directly proximally and the calcaneum passes medially so as to underlie the talus. The lateral malleolus in the 52 mm. fœtus extends as far distally as the proximal surface of the calcaneum. Even by the thirteenth week, however, the bones have not assumed the relative positions they have in the adult, as the calcaneum still lies relatively laterally. The relative positions of the calcaneum and the talus, in the 52 mm. and 85 mm. fœtus, can be appreciated by reference to Figs. 2 and 3.

In a 52 mm. fœtus, the upper surface of the sustentaculum tali is on the same horizontal plane as the upper surface of the main body of the calcaneum (Fig. 2) and, as the plantar calcano-navicular ("spring") ligament is early differentiated, the head of the talus, which rests on it, has then its normal high position in the medial arch. In the chimpanzee and gorilla, which do not have longitudinal arches, the sustentaculum has a low and oblique position on the medial side of the calcaneum so that the head of the talus is near the ground. In Fig. 2 the interval between the calcaneum and the talus lateral to the sustentaculum is the sinus tarsi and in it there are fibres of the interosseous ligament; the fibres of the ligament are continuous with the perichondrium of the cartilage.

In sagittal sections of the foot of an 85 mm. human fœtus (Figs. 3 *a* and 3 *c*) the medial and lateral arches have a relative height which is comparable with the appearance in the adult. A section through the long axis of the third metatarsal (Fig. 3 *b*) shows an arch intermediate in height between the medial and lateral arches. This arched formation of the cartilage and bones has been demonstrated in fœtuses of all ages and in the new-born child.

The opinion sometimes expressed that the arches are absent in the fœtus and new-born is probably accounted for by the inverted position of the foot and the plantar pad of fat which is present at these times and masks the arches. The skeletal form, therefore, cannot be judged until the specimen is sectioned or dissected.

Discussion

These observations have left us in no doubt as to the existence of a longitudinal arch as a constant architectural feature of the foot. On the other hand no support can be derived from the facts of development for the presence of an anterior metatarsal arch. Certain important practical considerations follow.

ANTERIOR METATARSAL PAIN AND METATARSALGIA

It seems desirable to dispense with the clinical diagnosis of "anterior flat-foot" in our surgical teaching. A few surgeons—including Bankart—have already adopted this attitude, but the phrase still prevails in many clinics. It is not difficult to find an alternative and more scientific and accurate explanation for pain in relation to the metatarsal heads. Normally the 2nd, 3rd, and 4th metatarsal heads support only half of the weight which is distributed through the forefoot. If this load is increased there results a splaying of the metatarsal heads, which in time leads to stretching of the transverse ligaments of the metatarsal heads. This ligamental strain is without doubt the common cause of pain in the ball of the toes, and is a much less bizarre explanation than "dropping" of the metatarsal heads. It seems quite in order to refer to the syndrome as metatarsalgia; but it should be distinguished from another form of metatarsalgia described by Morton. Morton's metatarsalgia is a true neuritis of the digital nerves, caused by compression of the nerves between too closely approximated metatarsal heads; it is very rare and very resistant to treatment.

Several possible factors may lead to an increased weight distribution on the lateral metatarsal heads. One of these, according to Bankart, is diminished weight bearing on the first metatarsal head, and Morton has stressed the frequent occurrence of congenital anomalies of the first metatarsal which may lead to this. One of us (Bruce 1937) has amply confirmed the truth of Morton's observations on metatarsalgia, and other forefoot disturbances such as Köhler's disease and the marching foot, of which metatarsal pain is a constant feature.

Additional evidence of over-strain as a factor in the production of metatarsal pain is to be found in the frequently dorsiflexed position of the toes. This is due largely to the unopposed contraction of the long and short extensor and flexor tendons, in consequence of the insufficiency through atrophy of the lumbrical-interosseous mechanism. Normally the contraction of the lumbrical-interosseous system, by the flexion of the metatarso-phalangeal joint and by extension of the interphalangeal joints, allows the long and short flexors to maintain the plantar surface of the toe in contact with the ground as the body-weight is swung forwards on the ball of the toes in weight bearing. When the lumbricals and interossei are wasted, however, the joint is dorsiflexed, and the unopposed long and short flexor muscles act merely to flex the interphalangeal joints. The toes now take no share in the activity of the forefoot, and the metatarsal heads are thus placed at a considerable

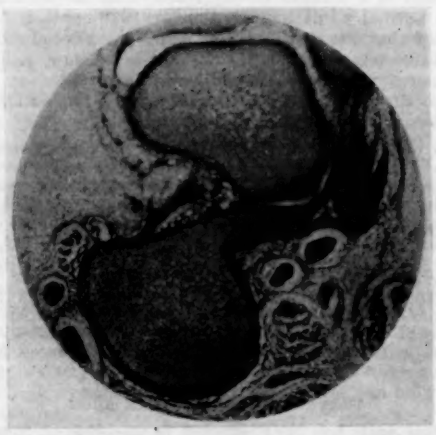

FIG. 2.—Transverse section through the talus and calcaneum of a 52 mm. human fœtus. The sustentaculum tali projects medially and its upper surface is in the same plane as the upper surface of the calcaneum.

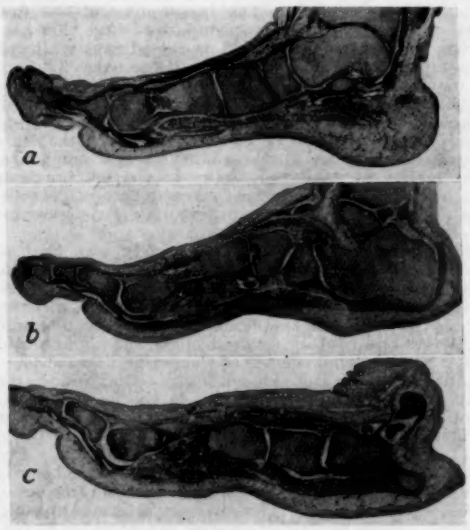

FIG. 3.—Sagittal sections of the foot of an 85 mm. human fœtus (*a*) through the first metatarsal; the only part of the calcaneum showing in this section is the sustentaculum tali; (*b*) through the third metatarsal; and (*c*) through the fifth metatarsal.

disadvantage. It seems quite clear to us that the general picture in so-called metatarsalgia is essentially one of forefoot strain.

So far as *treatment* is concerned there are three points of practical importance. Appliances or pads which are intended to lie under the intermediate metatarsal heads, and restore an imaginary arch, are wholly irrational. A metatarsal bar is useful in so far as it increases the effective weight-bearing surface of the metatarsal region; but ultimate success depends on restoring the balance between the metatarsus and its load. This last end may be served in several ways. Regulation of the body-weight is always an important consideration, and circular strapping of the forefoot may relax the overstretched transverse ligaments. The most important single step, however, is the restoration of functional activity to the lumbrical-interosseous system, and in this connexion the preliminary correction of a fixed toe deformity is essential. Tenotomy of the extensor tendons on the dorsum of the foot and of the contracted flexors opposite the interphalangeal joints will permit the toes to be straightened easily; if thereafter they are kept in the corrected position by means of a plaster-of-Paris case for some weeks, and if a metatarsal bar is worn on the shoe after the removal of the plaster, recurrence of the metatarsalgia will mostly be avoided.

LONGITUDINAL FLAT-FOOT

While we have no doubt that the normal human foot is longitudinally arched it does not follow that loss of the arch must be associated with symptoms. Actually a foot flat in its longitudinal axis is often quite painless, until in late adult life osteo-arthritic changes appear in the tarsal joints. The indiscriminate use of the term "flat-foot" to account for pain in the region of the head of the talus is therefore to be condemned. Pain is more commonly felt while the ligaments supporting the arch are being strained; it is therefore due to the flattening rather than the flattened foot, and occurs in circumstances associated either with overloading of the arch—e.g., occupational strain, increase in the body-weight—or with factors undermining the health of the structures supporting the arch—e.g., loss of tone in the muscles from disuse through illness or long recumbency. A better description of the resulting clinical syndrome would be "longitudinal foot strain." Pain due to adhesions in osteo-arthritis of the tarsal joints in association with flat-foot must be placed in quite another category, for the symptoms here depend less on the depressed arch than on the almost inevitable occurrence of structural changes in joints which are deformed and have their articular surface malaligned. In this late adult type there is some justification for the use of the term "painful flat-foot"; the condition could as accurately be named "chronic tarsal arthritis."

Treatment.—It is thus clear that attempts to straighten the foot, and to obliterate the arch completely by manipulation, are contra-indicated in cases of longitudinal foot strain. In these cases the proper measures appear to be an improvement in the muscle tone of the foot by an appropriate mixture of rest and exercise, together with some adjustment of the load by regulation of the body-weight, and its partial deflection to the outer side of the foot by raising of the inner part of the sole. In chronic tarsal arthritis however, just as in chronic arthritis at other joints, considerable improvement may result from a correctly applied and well-executed manipulation. Experience of such improvement does not justify the manipulative obliteration of the arch in the adolescent or young adult, nor does it prove that the longitudinal arch of the foot is nothing more than a structural deformity of the civilised races.

SUMMARY

The conventional clinical teaching on the arches of the foot is reviewed and the clinical evidence for the presence of an anterior metatarsal arch criticised.

A series of sections and dissections of fœtal feet of different ages have been made and examined. These all demonstrate that the longitudinal arch is present from the time that the cartilaginous precursors of the foot bones are formed. A transverse arch is also invariably present in the region of the bases of the metatarsals. No evidence has been obtained, however, to suggest the presence of a transverse arch in the region of the heads of the metatarsals in either fœtal or adult feet. A plea has therefore been put forward that the diagnosis of "anterior flat-foot" should be dispensed with. The mechanism and treatment of metatarsalgia and longitudinal flat-foot are discussed.

In conclusion we would like to express our gratitude to Sir John Fraser and Prof. J. C. Brash for their help in the preparation of this paper. We would also like to thank Mr. John Borthwick of the anatomy department for the photographs.

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BRITISH COLLEGE OF OBSTETRICIANS AND GYNÆCOLOGISTS.—The eighth dinner of the college will be held on Friday, Oct. 28th at Claridge's, Brook-street, London, W., at 8 P.M. The official guest will be Dr. Robert Hutchison, P.R.C.P., and Mr. Hugh Lett, P.R.C.S.

COARCTATION OF THE AORTA

REPORT ON TWO CASES

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LATE SENIOR RESIDENT ANÆSTHETIST AT LEICESTER ROYAL INFIRMARY; AND

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LATE SENIOR HOUSE PHYSICIAN AT THE HOSPITAL

NOT long ago two cases of coarctation of the aorta were admitted to the Leicester Royal Infirmary within two months of each other. They are interesting not only because the condition is rare but also because both were sent to the hospital as surgical cases. Case 1 simulated at first an acute abdomen; Case 2 was referred to surgical out-patients for the investigation of obscure lumbar pain.

THE FIRST CASE

The first patient, a motor mechanic of 24, was admitted to the Royal Infirmary as a surgical emergency on May 20th, 1937, complaining of acute pain in the abdomen and back.

History.—He was a well-built and well-nourished man who had been in good health except for slight shortness of breath when climbing stairs. At 2 P.M. on the day of admission, whilst at work, he felt epigastric discomfort lasting a few minutes. He continued his work but two hours later became ill with increasing pain. Soon after returning home at about 6 P.M., he was seized with a very severe tearing pain which began in the epigastrium and radiated through to the thoracic spine. He felt sick and fainted.

On admission at about 10 P.M., he was cyanosed and in an extreme state of shock and kept vomiting small amounts of bile-stained fluid. His temperature was subnormal and pulse uncountable. No physical signs were found in the lungs. By percussion the heart seemed to be enlarged but no impulse could be felt. The heart sounds were almost inaudible. The abdomen was moving freely, but there was tenderness with rigidity over the upper part of the right rectus muscle. There was no palpable mass and the liver dullness was not diminished. The fingers were not clubbed and examination of the back showed no swelling or tenderness. A provisional diagnosis of acute pancreatitis was made and the patient placed under observation. Next morning his condition had improved slightly but bilious vomiting persisted at intervals. Although his pulse was now just palpable, the cardiac sounds were not audible. By 5 P.M., however, he was well enough to sit up in bed without assistance and his pulse-rate had fallen to 90. The area of cardiac dullness now extended from 1¼ in. beyond the right sternal border to 6¾ in. from the left border in the sixth intercostal space. Both sounds were very distant and a short diastolic murmur could be heard over mid-sternum. His pallor and cyanosis varied until the early hours of May 22nd when vomiting recurred. There was now a weak but palpable apex-beat 7 in. from the midline in the sixth left intercostal space. The sounds were weak, the first rough in quality and the second followed by a faint diastolic bruit which could be heard all over the precordium. Pulsation, although not strong, could be distinctly felt in the femoral artery and there was no visible evidence of any collateral circulation. Pulsus paradoxus was noticed for the first time shortly before he collapsed and died at 2 A.M., 36 hours after the onset of his illness.

Investigations.—Urinary diastase was at the low level of 3 units, which opposed the original diagnosis. A radiogram of the chest was taken by a portable apparatus on May 21st (Fig. 1), but the patient was too ill at this time to sit up for a 6-foot film. The report is as follows: "The shadow of the heart and great vessels show gross enlargement extending both to the right and to the left. The broadening of the first part of the aorta is very pronounced and this continues to the knuckle which is raised and widened. The superior vena cava appears distended. There is no marked pulmonary congestion. Definite notching of the 4th and 5th ribs on the left side is noted. Conclusions: the gross enlargement is due either to a pericardial effusion or to acute myocardial failure associated with an aortic aneurysm; a congenital abnormality is suspected owing to the rib notching which is sufficient to suggest some degree of coarctation of the aorta." It was unfortunately not possible to secure an electrocardiogram.

Post-mortem examination.—The body was that of a well-developed man without any external congenital abnormality. On opening the thorax the pericardial sac was found to be greatly distended, measuring 7½ in. in both the transverse and longitudinal diameters and containing fluid blood and some recent clot. The external surface of the pericardium showed old inflammation and thickening, probably associated with a past attack of pleurisy, as the left lung was completely adherent to the pleura. The apposing surfaces of the pericardium were separated by blood and showed no evidence of inflammation. The anterior surface of the heart (Fig. 2) was heavily loaded with fat. The heart and vessels, free from blood, weighed 21 oz. The coronary arteries appeared normal. Both ventricles showed considerable hypertrophy. The left auricle and appendix were in extreme systole. The right auricle and appendix were moderately distended and the muscle thicker than normal. The mitral and tricuspid valves were normal.

The aortic valves, three in number, were irregular in thickness but showed neither atheroma nor evidence of bacterial endocarditis. The anterior cusp was tethered to the aorta by three string-like bands, one on the left 1·5 cm. long and two on the right 0·75 and 0·5 cm. long. Between the last two was a bullous outgrowth of endocardium. The right lateral cusp was fenestrated. The irregularity of the valves must have caused some degree of incompetence during life.

The ascending aorta showed a fusiform dilatation and two saccular aneurysms (Fig. 3). The posterior sac was the more recent and had ruptured and caused the hæmopericardium already mentioned. The arch of the aorta was hypoplastic, measuring only 2 cm. in external diameter, and was acutely kinked between the origins of the left common carotid and subclavian arteries which were abnormal in position and widely separated at their emergence from the aortic arch. Coarctation of the aorta appeared at the level of the persistent ductus arteriosus. At this point the aorta was constricted as though tied by a string, its external diameter being 1·5 cm. and internal rather less than 0·5 cm., and then immediately widened again to 3 cm. in diameter. The ductus arteriosus was about 1 cm. long. It had a lumen 2·5 mm. wide at the aortic end but was occluded near the pulmonary artery, on the intima of which the position of the ductus was indicated by a dimple.

When the aorta had been opened in the aneurysmal part, the intima was found to be dissected off the muscular coat and hanging free with ragged margins. The space between was filled by old organising clot and recent blood. A small linear tear was found in the wall of the posterior aneurysm extending through the muscular coat and pericardium into the pericardial space. The anterior aneurysmal sac was of an earlier date. In the intima of this there was a transverse rent leaving the media to form the covering. Unlike the ragged muscularis with adherent blood clot of the later sac, this one was lined with a smooth white secondary membrane. The lining of the fusiform portion was intact and showed no atheroma. Above the coarctation there was a small patch of atheroma, and immediately below it a small area of the endothelium was raised and reddened by subacute infective endarteritis.

The liver weighed 4 lb. 3 oz. and was congested. The spleen weighed 9 oz. It was firm and there were no infarcts. The other organs were normal, and no other congenital abnormalities were found.

In the radiogram taken before death there was notching of some of the ribs posteriorly indicating that the intercostal vessels had enlarged to provide a collateral circulation. These vessels were looked for but were not found. Taking into consideration the extreme degree of narrowing of the aorta and closure of the ductus arteriosus and with the active life led by the patient as a motor mechanic to the age of 24, there must have been a larger collateral circulation than was demonstrated.

THE SECOND CASE

A warehouse boy of 17 was admitted on July 16th, 1937. His history was that he had always been a delicate child up to the age of 14. He played the usual games at school and contracted whooping-cough, chicken-pox, measles, and mumps. He had three severe attacks of epistaxis when he was 7, 10, and 14. Since going to work he had developed in physique and seemed to have become much stronger, but he was subject to colds and sore-throats. Six weeks before admission he complained of pain in the lumbar region and in both thighs which was at first thought to be due to lumbago but failed to improve with rest and medical treatment.

On admission he was pale, sweating, and feverish. For three weeks he had irregular pyrexia of 100°–101° F., but thenceforth he was afebrile until 36 hours before his death. His pulse-rate throughout his stay was seldom more than 90. A blowing systolic murmur, localised to the left sternal border, and a blood pressure of 190/110 are recorded in the admission notes. A blood count on the 17th showed hæmoglobin 83 per cent., red cells 4,860,000, and white cells 13,800. Wassermann reaction negative. The urine contained a trace of albumin, but no blood, casts, or organisms were seen. Blood-urea 20 mg. per 100 c.cm.

Course of illness.—During the next month his blood pressure rose to 215/110. A radiogram of the chest taken on Sept. 4th (Fig. 4) showed the cardiac outline to be enlarged in the transverse diameter. Some notching of the ribs does show in this film, but special attention was not drawn to it at the time.

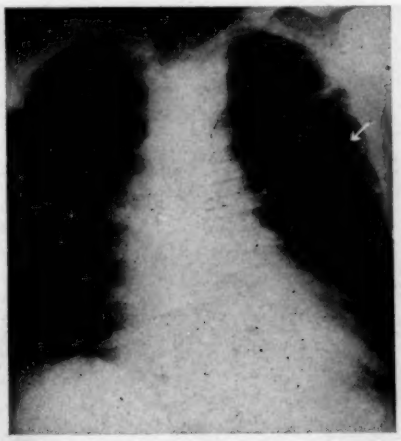

FIG. 1.—Radiogram of chest in Case 1 taken by portable apparatus. Shows widening of aorta and increase in whole cardiac shadow due to hæmopericardium. Arrow indicates notching of ribs.

On Oct. 4th, as no definite diagnosis had been established, the case was carefully reviewed. On examination the face was flushed and congested; there was no sign of clubbed fingers, petechiæ, or splenomegaly. The patient complained at this time of severe headache, but no sign was found of organic brain lesion. The heart apex-beat was now found in the 4th interspace about 3¼ in. from the midline. This measurement is not exact because of a deformity of the sternum at the angle of Ludwig. Both sounds were clearly heard in all areas, the apical first sound was accompanied, as before, by a loud blowing systolic bruit conducted to the pulmonary area. The second sound in the aortic area was ringing in character. Pulsation was very obvious in the arteries of the neck and could be felt but not seen close to the inner borders of both scapulæ. Blood pressure in the arms was 180/100 and in the legs 110/90. The radiogram was reviewed and a clinical diagnosis of coarcta-

FIG. 2.—Anterior view of heart in Case 1 showing aneurysms of ascending aorta, abnormal arrangement of arteries arising from aortic arch, persistent ductus arteriosus, and coarctation of descending aorta.

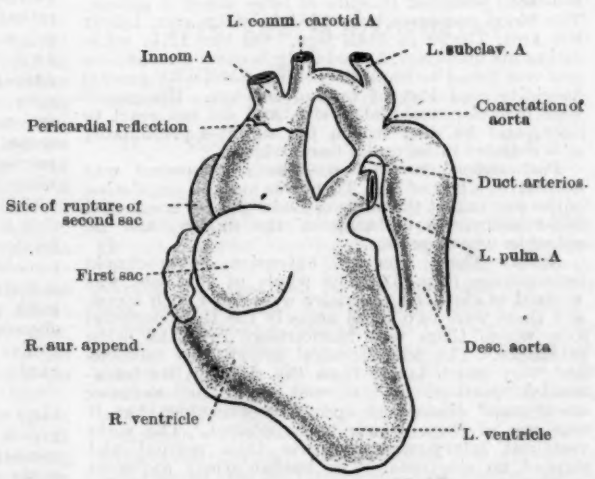

FIG. 3.—Diagram of heart and great vessels in Case 1 showing two aneurysmal sacs and fusiform enlargement of ascending aorta, hypoplasia of arch, and coarctation of aorta at level of origin of ductus arteriosus.

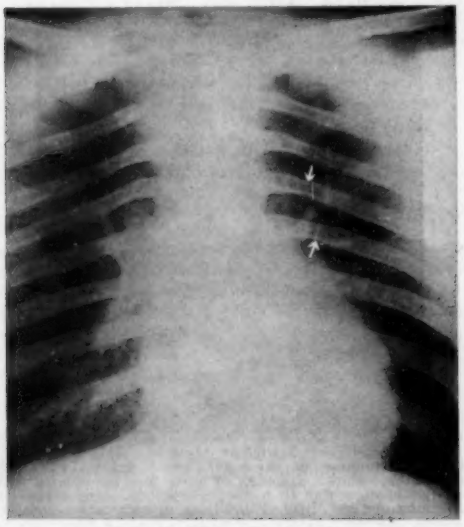

FIG. 4.—Radiogram of chest in Case 2 showing hypertrophy of left ventricle, diminution of aortic knuckle, and notching of lower borders of 5th and 6th left ribs.

tion of the aorta was then made, a week before the patient's death. The radiographic report of a 6-foot film taken on Oct. 6th is as follows: "The heart is enlarged in the transverse diameter and there is a marked prominence of the left border. The pulmonary arc is full but this is accentuated by absence of the aortic knuckle. On the left side definite notches are present on the inferior margins of the 5th and 6th ribs about 1 in. from their necks. Conclusions (no screen examination was possible): the shape of the heart suggests a marked left ventricular hypertrophy and the absence of an aortic knuckle in conjunction with the rib notching favours a diagnosis of coarctation of the aorta." An electrocardiogram on Oct. 6th showed left axis-deviation. In both the first and second leads the Q R S complex was somewhat widened and slurred on the downstroke.

On Oct. 9th he complained of severe headache and his temperature rose to 101° F. Next morning the headache persisted in spite of large doses of aspirin. The blood pressures were 178/100 right arm, 182/92 left arm, 110/90 in both legs. On the 11th, while eating his breakfast, he suddenly became unconscious and was found to be in deepening coma with general flaccidity and loss of tendon reflexes. His pupils were irregular, unequal in size, and did not react to light, and he died within ten minutes presumably of a massive intracranial hæmorrhage.

Post-mortem examination.—The development was normal for a boy of 17. There was marked angulation of the sternum at the angle of Ludwig. No congenital abnormality, no clubbing of the fingers, and no petechiæ were present.

Brain.—There was an extensive subarachnoid hæmorrhage (Fig. 5). The whole of the base was covered in clot, the ventricles were filled with blood, and there were two small areas in the right occipital lobe where there was hæmorrhage into the brain substance. The left vertebral artery was tortuous and very much larger than the right in its intracranial portion. It showed irregular saccular aneurysmal dilatations and it is probable that it was one of these which had ruptured. The right vertebral artery was narrower than normal and showed no atheroma. The basilar artery appeared normal.

Heart and vessels.—The pericardium was normal. The heart-muscle was hypertrophied chiefly in the left ventricle. There was no abnormal dilatation of any chamber. The coronary arteries were considerably thickened by increase in the media, but there was no endarteritis. The valves were normal with the exception of the mitral, which showed a mycotic aneurysm at the attachment of the chordæ tendineæ to the right cusp. The cusps of the aortic valve, the ascending aorta, the arch, and the three main arterial trunks showed no abnormality until beyond the origin of the left subclavian artery. At the point where the recurrent laryngeal nerve hooked round the arch of the aorta there was a thickening of the wall and a narrowing of the lumen to 1 mm. bore (Figs. 6 and 7). The position of the coarctation also corresponded to the insertion of the ductus arteriosus which was not patent in any part but showed a dimpling in the intima of both the aorta and pulmonary artery where the orifices had been closed. The coarctation was not of the abrupt type as in the previous case, but there was a more gradual narrowing. The wall of the aorta was thickened for about 1 cm. in this region so that externally the change in calibre was not very obvious. Immediately distal to the coarctation there was an area of subacute endarteritis with shaggy vegetations and blood clot. Beyond this arose the first two pairs of intercostal arteries which were dilated and hypertrophied and corresponded to the notching of the ribs seen in the radiogram (Fig. 4). The lower intercostal arteries appeared to be smaller than normal. The internal mammary arteries showed great hypertrophy and had acted as the main conductors of blood to the lower part of the body (Fig. 6). They were nearly as large as the abdominal aorta which was hypoplastic, as were also the femoral arteries. The *spleen* weighed 1 lb. 6 oz. An old white infarct was present on its anterior free margin. On the cut surface the Malpighian bodies were particularly distinct. No other abnormality was found.

COMMENT

Both patients died of hæmorrhage due to the abnormally raised blood pressure in their upper extremities acting on defective arterial walls. This defect is considered to be developmental rather than acquired. In Case 1 the saccular aneurysms formed at the site of greatest strain in the ascending aorta, which was already dilated and fusiform. In Case 2 the discrepancy in development of the vertebral arteries indicates that the multiple aneurysms of the left are congenital rather than mycotic, and their association with coarctation of the aorta supports this view (Boyd 1935). If this is so it is interesting to note that, whereas both cases showed infective endocarditis in similar positions beyond the constriction of the aorta, this was not the cause of death in

FIG. 5.—Lower surface of brain in Case 2 showing subarachnoid hæmorrhage and gross difference in size of vertebral arteries. Right artery is hypoplastic and left is tortuous with aneurysmal dilatations.

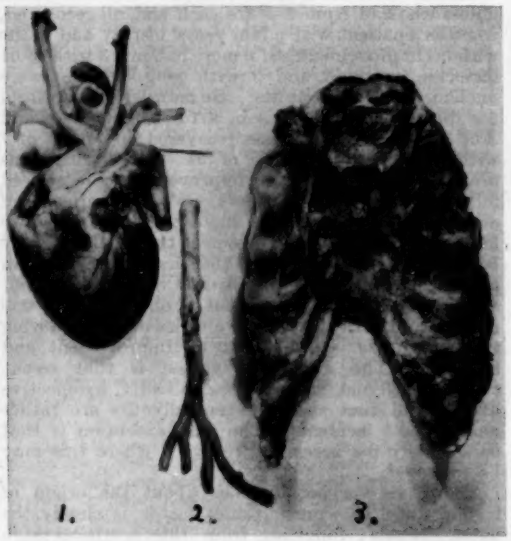

FIG. 6.—1. Heart with left recurrent laryngeal nerve reflected to expose constriction in aorta beneath. 2. Hypoplastic abdominal aorta and iliac arteries. 3. Internal surface of sternum showing hypertrophied internal mammary arteries.

either, nor is it a common termination (Poynton and Sheldon 1928). The first case showed neither clinical nor post-mortem evidence of anything further than an early patch of endarteritis, and, although the aortic cusps were congenitally malformed, they did not show any vegetations. These structural defects in the aortic valves were of the minor kind often associated with coarctation of the aorta (Abbott 1928). In the second case there was pyrexia for several weeks and the splenic infarction and mycotic aneurysm on the mitral valve seen at the post-mortem examination proved the activity of the infective process. No bacteria were demonstrated in the microscopic sections of the vegetations in either case.

Case 1 shows how closely a dissecting aneurysm or hæmopericardium may simulate an intra-abdominal emergency and that valuable information can be obtained from a portable X ray apparatus, where the diagnosis is in doubt. Electrocardiography did not help in the diagnosis, and, as in the cases described by Sir Thomas Lewis (1933), it was only when an examination of the femoral blood pressure and collateral circulation had been made that the diagnosis at length became apparent in Case 2. Neither of these patients died from primary cardiac failure, which according to White (1937) accounts for the death of a third of all cases.

Coarctation of the aorta is classified after Bonnet into infantile and adult types. Evans (1933), however, considering 28 cases upon anatomical grounds, defines six types. Approximately a third of his cases belonged, as do these, to type 2, which has the longest expectation of life.

Notching of the lower borders of some of the upper ribs by communicating vessels was present in both patients (Roesler 1937). In the first case the notching was in the fourth and fifth ribs on the left side only, but no enlarged vessels were found at autopsy to correspond. In the second case the notching was again on the left side only and enlarged intercostal

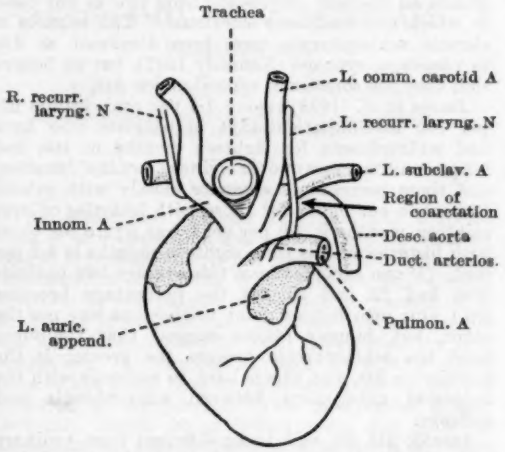

FIG. 7.—Diagram of heart in Case 2 showing position of coarctation in relation to left recurrent laryngeal nerve and ductus arteriosus.

vessels were found to match this. In addition Case 2 showed radiological enlargement of the left ventricle and insignificance of the aortic knuckle, signs which Taylor (1934) found in nearly all her cases.

We wish to thank Mr. W. I. Cumberlidge and Dr. J. V. C. Braithwaite for their permission to report these cases; Dr. A. S. Johnstone for his radiological reports; and Dr. W. D. Jeans and Mr. Calder for the photography.

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FITS AND SCHIZOPHRENIA

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MEDICAL SUPERINTENDENT OF THE HOSPITAL

WHEN Sakel began his insulin treatment of schizophrenia fits were considered an unpleasant complication. The success of Meduna's method, however, showed that they can be beneficial, and the latest plan is to combine hypoglycæmia and convulsion therapy, fits being induced with Cardiazol an hour or two after insulin has been injected (Georgi 1937, James et al. 1938, Finiefs 1938). At Hatton we have used both methods, but have avoided mixing them until our ideas about each are clearer.

Meduna's treatment developed from a supposed antagonism between schizophrenia and epilepsy—two diseases that are rarely found in the same patient. In our experience, the association of epilepsy and melancholia is rarer. Moreover though schizophrenia is said to improve when epilepsy develops we have

gained an opposite impression from two of our cases in which the conditions coexisted. The seizures of chronic schizophrenia have been dismissed as due to vasovagal syncope (Kennedy 1937), but we believe that they are sometimes typical major fits.

James et al. (1938) report 1·7 per cent. insulin fits per 100 insulin-patient-days in patients who have had schizophrenia for eighteen months or less and 6·5 per cent. in cases of over eighteen months' duration, and these percentages compare closely with others. But while our figure for those with histories of over eighteen months is 7·9 per cent. our figure for those with histories of less than eighteen months is 8·2 per cent. (If one excludes from this average two patients who had 22 and 21 fits the percentage becomes 5·6.) Our own figures point neither one way nor the other, but James's results suggest that the more fixed the schizophrenic process the greater is the liability to fits, and this is hard to reconcile with the suggested antagonism between schizophrenia and epilepsy.

Insulin fits are said to be different from ordinary epileptic fits because epileptics—whether traumatic, idiopathic, or schizophrenic—fail to develop fits when given insulin (Day et al. 1937, Ziskind 1936). But our two schizophrenics with epilepsy had frequent and typical fits before coma when treated with insulin, and one of two young epileptics, who had had no fits for several months and whose phenobarbitone was given regularly during insulin treatment, had 6 fits in a few days, 2 before coma and 4 after.

We believe, therefore, that the suggested antagonism between schizophrenia and epilepsy is very far from proved.

INSULIN FITS

Fits in association with insulin hypoglycæmia may occur before, during, or after coma. Fits after coma are rare and we have seen 155 fits before coma and 77 during coma. After our first 22 completed cases (Parfitt 1937) we thought that the fits tended to be concentrated in the first third of the course of treatment, but now that we have completed 59 cases this view has been modified because the majority have had fits spread more or less evenly through the course.

The percentage of patients who develop fits is usually given as 30 to 45, the affected patients averaging three each, but Lemke (1937) had 54·3 per cent. of cases showing major epileptic attacks and 43 of our 59 cases have had fits (73 per cent.) averaging 5·9 each. Of these 43 patients 22 had fits before and during coma, 12 before coma, 8 during coma, and 1 only after coma.

Continental accounts of the good effects of fits in schizophrenics receiving insulin treatment have been corroborated in this country by James et al. (1938) and Finiefs (1938). Sakel has stated that fits are commoner in "dry" shocks and believes in the value of fits although he thinks dry shocks make the prognosis worse. James had 10 with a history of symptoms of less than eighteen months in his first 24 patients treated, and 9 of these 10 were discharged from hospital as recovered. Of the 9 discharged 4 had one fit each during the whole course of treatment and he states that improvement dated from the fit in each case, although of 14 patients with a history of over eighteen months 3 were discharged after having had three insulin fits and five cardiazol fits between them (average 2·7 each) and 11 were unimproved after 65 insulin fits and 53 cardiazol fits between them (average 10·7 each). Two of his cases were worse mentally after fits.

Finiefs describes 5 cases with less than one year's illness who had from 1–4 fits each and all recovered, whereas a patient with a four years' history had 11 fits without improvement. Of 6 more patients 3 with short histories recovered and 3 with long histories were unchanged, all without fits. He induced 4–8 cardiazol fits during hypoglycæmia in a further 10 cases and 2 of 3 with recent histories recovered and 1 out of 7 with long histories. One of us (Parfitt 1937) has previously stated that no improvement was noticed following fits in 17 patients. With experience of a further 26 patients who have had insulin fits we have only twice seen improvement that could possibly be attributed to fits. In the first there was an increased willingness to talk and better behaviour after each fit, but this patient is on the whole still unimproved. In the second, a series of 21 fits during treatment was accompanied by improvement and discharge. The impression gained is that recent cases do well and chronic cases do badly, irrespective of fits, and that speaking generally fits are rather unimportant incidents. The only exception is that occasionally fits accelerate recovery where this may be expected.

There are varying opinions about the origin of insulin fits. The precipitating factor is clearly the hypoglycæmia; following from this a critical high level of cerebro-spinal fluid pressure causing hydration of an irritable cortex may be responsible, with fear as a predisposing factor. The C.S.F. pressure is said to rise in hypoglycæmia until coma develops, even to over 400 mm. of water, and to return to normal with coma; but in many of our cases the pressure was raised during coma. Georgi (1937) has suggested that the cell sugar falls very slowly in comparison with the blood-sugar until a maximum level gradient is reached and that this turning-point occurs about 1–2 hours after the injection of insulin when the majority of fits occur. After this, changes in cell membrane permeability in the presence of an alkalosis lead to the fall of the cell sugar which remains low during coma. When sugar is given the blood-sugar rises first and another gradient produces a liability to fits again.

The march of symptoms in hypoglycæmia (Parfitt 1937) seems too gradual to be explained by Georgi's hypothesis and our 155 fits before coma occurred in successive fifteen-minute intervals, commencing at 7.30 A.M. and finishing at 10.45 A.M., as follows: 3, 16, 13, 6, 7, 18, 14, 14, 20, 14, 16, 11, and 3. The even spread of these pre-coma fits does not lend support to any "turning-point." In any case the theory does not account for our 77 coma fits.

It has been shown in decerebrate animals that a fall in blood-sugar stimulates centres in the pons and medulla to produce fits and we think this mechanism is probably paralleled in patients who get fits when in coma, since the cortex is then out of action. There would thus be two kinds of fit in hypoglycæmia, one akin to ordinary epilepsy and developing while the cortex is still irritable and the other pontine or medullary. As our results have shown, patients may develop neither, both, or one or the other kind. It is possible that those akin to ordinary epilepsy only develop when epilepsy is latent or manifest. Coma fits showed less time-spread than pre-coma fits and this is only to be expected; in fifteen-minute intervals, commencing at 9 A.M. and finishing at 11.45 A.M., the numbers were 1, 2, 3, 5, 16, 15, 16, 10, 5, 3, 1, the tailing-off towards the end of coma being due to the fact that coma was usually terminated before 11.15 A.M. No therapeutic importance was found to attach to coma fits.

CARDIAZOL FITS

Meduna says of his fit treatment that favourable results may be expected from early cases where the onset is sudden and not developed gradually from an eccentric personality or superimposed on mental defect and in cases where there is no serious psychopathic heredity. But this might have been said long before insulin or cardiazol were ever used in medicine.

We have finished a course of treatment, or been forced to abandon it, in 34 cases. Meduna states that a history of over four years rules out the possibility of benefit which is unlikely even after two years; but Cook (1938) obtained definite improvement in cases with a history of over two years. We treated 15 cases with a history of symptoms for longer than two years and 10 cases with a history of longer than three years and obtained no improvement whatsoever. Their ages varied from 20 to 42 (average 29·5) and the number of fits varied from 17 to 24 (average 21·5)

Of 7 patients unsuccessfully treated with insulin, 2 had a history of less than two years and 5 of over two years; with cardiazol none showed any change except that one became extremely aggressive and another pitiably apprehensive. Fits varied from 15 to 22 and averaged 17·1.

Another 7 patients with a history of less than two years showed better results and 4 were discharged. One had had 3 fits when a fractured clavicle stopped treatment, but improvement continued; one had 7 fits and another 30 fits before recovery and these 3 were all stuporose katatonics. The last to be discharged was a lively aggressive paranoid aged 37 with a history of severe symptoms of almost two years' duration who improved dramatically after 2 fits. Similar striking results have been seen in this type of case (paranoid reactions developing at about 40 years of age) with somnifaine prolonged narcosis (Parfitt 1936). Of the remaining 3, 1 was improved and 2 unchanged.

In 2 patients treatment was abandoned because of the difficulty of inducing fits, in 2 more because of the extreme fear and excitement aroused, and in 1 it was abandoned because of a severe collapse after the fourth fit. One epileptic patient, selected because of the peculiar succession of bleating sounds that preceded his fits, was given 0·5 g. cardiazol intravenously and a fit was induced identical with his ordinary attacks; but post-epileptic confusion was not so evident.

Of all injections (including immediate repeats where these were indicated), 81 per cent. were successful in inducing fits. A first fit was secured with 4 c.cm. of 10 per cent. cardiazol in 14 patients, with 5 c.cm. in 11, with 6 c.cm. in 6, with 7 c.cm. in 1, and with 8 c.cm. in 1. The increase in quantity necessary to produce fits to the end of the course varied from 0 to 6 c.cm. (average 2·8). Complications of treatment were one fractured clavicle, one dislocated shoulder, and one dislocated jaw, the last being repeated with several successive fits.

Our results with insulin have been only slightly better than with earlier methods of treatment, but the period of illness is considerably shortened. We regard the results of cardiazol therapy as less convincing than those of insulin.

CONCLUSIONS

1. The antagonism of schizophrenia and epilepsy is far from proved.

2. Insulin fits do not affect the ultimate prognosis in schizophrenia and at most may accelerate expected recoveries.

3. The same may be said of cardiazol fits.

(*References at foot of next column*)

KETONÆMIA IN DIABETES AND PREGNANCY

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DIABETES

The association between ketonuria and diabetic coma is now generally accepted on a wide basis of clinical experience and it has been supposed that the variations in ketonuria which reflect the clinical condition of the patient correspond to variations in the degree of ketonæmia. In 1930, however, Dodds and Robertson claimed to have shown that the concentrations of aceto-acetic and β-hydroxybutyric acids in the blood bear no relationship to the clinical condition of the patient. This unexpected finding obviously raised issues which were not only of theoretical but also of practical importance, and since a method of estimating the quantity of ketone bodies in small amounts of blood is now available (Cantoni 1935, Gray 1937) it was thought desirable to reinvestigate the point. Not only has it been impossible to confirm the work of Dodds and Robertson but the results obtained have been in direct opposition to theirs; a close agreement has been found both between the degree of ketonæmia and the clinical condition of the patient and between the degree of ketonæmia and the degree of ketonuria (Table I).

TABLE I—RELATION BETWEEN KETONURIA, KETONÆMIA, AND CLINICAL CONDITION

Diagnosis.	Cases.	Urine.		Blood ketones (mg./100 ml.).
		Rothera.	Ferric chloride.	
Normal	25	Negative.	Negative.	1·0–2·0
Hysterical anorexia	1	Positive.	Negative.	4·0
Diabetes without clinical acidosis..	13	Positive.	Negative.	1·4–6·4
Diabetes with clinical acidosis..	8	Positive.	Positive.	6·4–42

In 25 estimations of blood ketones on normal human adults the figures ranged from 1·0 to 2·0 mg. per 100 ml.* of blood; these values approximate closely to those obtained with healthy normal infants. A case of hysterical anorexia with vomiting for ten days gave a figure of 4·0 mg.

* In these experiments all the figures for ketone bodies have been expressed as mg. acetone per 100 ml., and are therefore not quantitatively comparable with the figures of workers using other methods of determination. In order that the actual amounts of ketone bodies may be computed, assumptions are necessary regarding the ratio of the individual ketone bodies.

(*Continued from previous column*)

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In 13 cases of diabetes in which the Rothera test on the urine was positive but the ferric-chloride test negative, the results ranged from 1·4 to 6·4 mg. per 100 ml. of blood. In all these cases the intensity of the Rothera reaction varied with the degree of ketonæmia.

In 8 cases in which both the ferric-chloride and the Rothera tests were positive the values ranged from 6·4 to 42 mg. per 100 ml. of blood. In these cases the severity of the clinical condition varied very definitely with the degree of ketonæmia; those with figures from 6·4 to 20 mg. per 100 ml. of blood showed clinical signs of slight acidosis while those with 20 to 35 mg. were drowsy and markedly acidotic.

In 2 cases of diabetic coma the figures were 38 and 42 mg. per 100 ml., and in these and in 1 case of a diabetic in a precomatose condition the ketonæmia was determined at intervals during treatment (Table II). The close parallelism between the degree

TABLE II—RELATION OF KETONÆMIA TO KETONURIA DURING TREATMENT IN SEVERE DIABETES

Sex and age.	Time.	Blood ketones (mg./100 ml.).	Rothera test.	Ferric chloride.
	DIABETIC PRECOMA			
Female, 24	Before treatment	22	++++	++
	After beginning treatment—			
	1 hour ..	22	–	–
	2 hours ..	19	–	–
	3 „ ..	14	–	–
	4 „ ..	10	++++	+
	5 „ ..	5	–	–
	7 „ ..	3·2	++	0
	10 „ ..	2·4	++	0
	DIABETIC COMA COMPLICATING PREGNANCY			
Female, 28	Before treatment	38	++++	++
	After beginning treatment—			
	3 hours ..	29	+++	+
	3½ „ ..	19	–	–
	4 „ ..	16	–	–
	4½ „ ..	13	+++	faint +
	12 „ ..	5	–	–
	20 „ ..	1·6	+	0
	DIABETIC COMA			
Male, 15	Before treatment	42	+++ +	++
	After beginning treatment—			
	3½ hours ..	32	++++	++
	5½ „ ..	32	++++	+
	8½ „ ..	20	++++	+
	12 „ ..	8	++++	+
	15 „ ..	3·8	+++	0
	20 „ ..	1·6	++	0

– = no urine specimen available.

of ketonuria and the degree of ketonæmia is clearly shown in these figures, and the parallelism between the fall of ketonuria and of ketonæmia and the improvement in clinical condition was equally clear.

In none of these cases was the intensity of the ferric-chloride reaction obscured by the administration of salicylates, and under these conditions the intensities of the tests for urinary ketones varied in a very striking manner with the ketonæmia. Estimations of blood ketones are therefore ordinarily unnecessary in the diagnosis of ketosis in cases in which salicylates are excluded. Even where it is not known whether the patient has taken salicylates the performance of the ferric-chloride test on both boiled and unboiled urine can demonstrate the point. If the ferric-chloride test is still positive even after boiling then interfering substances must be present. It is always worth while to check the ferric-chloride reaction with the Rothera test. The ferric-chloride test detects ketone bodies in the urine only when they are present in relatively large amounts; the Rothera reaction detects them in minute quantities. It follows that a positive ferric-chloride reaction due to ketone bodies is never found save in the presence of a strong Rothera reaction. An apparently positive ferric-chloride reaction in the presence of a negative or weak Rothera test indicates clearly that the colour with ferric chloride is not due to ketone bodies.

Thus provided the tests for urinary ketones are properly carried out they give valuable indications of the degree of ketonæmia, and form a reliable method of diagnosing diabetic coma or impending coma and of following the reaction to treatment.†

PREGNANCY

Bökelman and Bock (1927) found that the ketone bodies in the blood and urine of pregnant women occasionally exceeded those of the non-pregnant, and, in view of the relationship between ketosis and hepatic fatty change and of the liver lesions (fatty change and necrosis) in eclampsia, an investigation of the ketone bodies in the urine and blood during pregnancy was carried out.

The results obtained with normal and with diabetic persons showed that the blood ketones were never raised except when the urine gave at least a strong positive Rothera reaction and this knowledge simplified the investigation of cases of pregnancy. About 3000 pregnant women were investigated and in each the urine was tested by the Rothera method. Only about 1 per cent. gave positive results and these were of a degree which previous experience had shown to be associated with no rise in blood ketones. Nevertheless the ketonæmia was determined in 15 cases and was found to vary within normal limits. The figures in 5 cases of eclampsia ranged from 1·4 to 2·4 mg. per 100 ml., which is practically normal.

It was noticed that those women whose urine gave positive results for ketone bodies usually had for some reason missed their previous meal. This point was investigated further and it was found that of 27 cases of pregnancy 17 gave positive Rothera tests after a fast of 14 hours, while of 27 non-pregnant women none gave a positive test after a similar period of fasting. Such findings are in partial agreement with those of Bullock (1930).

It therefore appears that the slight rises in ketonæmia reported by Bökelman and Bock are of no direct theoretical or diagnostic significance in the pregnancy toxæmia problem.

SUMMARY

Ketonæmia in normal human adults varies from 1·0 to 2·0 mg. per 100 ml. of blood. The figures for diabetics showing a positive Rothera reaction alone in the urine are 1·4 to 6·4 mg., and where the ferric-chloride reaction is also positive the figure is higher than this.

† In very rare cases of doubt the Cantoni method is of value since a rough figure for ketonæmia can be obtained within 45 min. of the collection of the blood. The colour upon which the estimation depends ordinarily requires at least 6 hours for its full development, but rough values may be obtained within 5 min. of the final heating.

In the cases investigated coma was associated with values above about 35 mg. per 100 ml. of blood and improvement in the clinical condition of the case ran parallel with the decrease in ketonæmia.

In pregnancy there is a greater liability to ketosis than in the non-pregnant state, but there is no significant rise in ketonæmia in either eclampsia or normal pregnancy.

I have to express my thanks to the staff of the medical and obstetric units of University College Hospital for permission to investigate patients in their care.

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STAPHYLOCOCCAL SEPTICÆMIA
TREATED BY M. & B. 693

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THE reports hitherto published of treatment by M. & B. 693 have mostly been of cases of pneumonia, gonorrhœa, and meningococcal septicæmia. We have had the opportunity of using this drug in a case of septicæmia due to *Staphylococcus aureus*.

The patient, a man aged 35, was admitted to the Brompton Hospital on June 27th last. He was a carpenter who had been in poor health for a few months and had had a dull pain in the lower left chest and left loin since June 6th. The pain was not continuous but had recurred daily; it had become rather less severe than at the onset. The patient had had night-sweats and thought he had lost weight. In February of this year he had had an abscess in the right forearm, which had been incised by his doctor seven times. The wound healed about 2 weeks after the last incision. He was off work for 10 days. On admission his appearance was sallow and toxic, with slight conjunctival jaundice. He had had a cough and much lassitude. There was a small amount of mucoid sputum. His appetite was fair, his digestion good, and his bowels constipated. Temperature 102° F. Examination of his sputum was negative.

On physical examination nothing definite was discovered in his chest beyond a small localised area of friction below the left nipple. His general nutrition was fair. The wound in his left arm had completely healed; there was evidence of a recent burn on the left chest wall as a result of poulticing. Heart and arteries were normal, blood pressure 120/70. Nothing abnormal in abdomen. Teeth carious, tongue coated, tonsils somewhat enlarged. No enlarged glands were discovered and the central nervous system appeared to be normal. Sedimentation-rate (Brompton method) was 4, well below the normal figure of about 9. Urine acid, S.G. 1020, excess of phosphates but nothing otherwise abnormal.

He was admitted to hospital in the first instance for diagnosis, pulmonary tuberculosis having been suspected. The report of a radiological examination (June 29th) was: "Slight scoliosis with dorsal convexity of the right. Left side of diaphragm, movements restricted. There is some basal pleural thickening. No effusion. No positive evidence of infiltration in either lung." A second examination (July 8th), with a portable apparatus, suggested that the pleural involvement of the left base had cleared, and a third on the next day showed no evidence of periostitis either in the radius or the ulna. The lumbar spine and pelvis showed no bony abnormality, and there was no evidence of pulmonary tuberculosis.

There was continued fever and the pulse-rate was high, with some increase in the respiration.

A blood examination was made on July 1st with the following result:—

Red cells ..	3,140,000	Polymorphs	95%
White cells ..	20,300	Lymphocytes ..	4%
Hæmoglobin ..	65%	Monocytes	1%
Colour-index ..	1·04	Eosinophils	Nil
Mean diameter R.B.C.	8	Basophils	Nil

The chief feature of this count was obviously the excess of white cells, made up mainly of polymorphs.

Up to this period the diagnosis was not very clear, but the blood count suggested a septic origin. Treatment on general lines directed mainly towards the anæmia had been without result, and it was thought probable that the patient was suffering from some form of septicæmia, with or without a local focus. A blood culture was obtained on July 5th, *Staph. aureus* being grown from both flasks inoculated. A Mantoux test was performed on the same day with a positive result.

On July 7th the centrifugalised deposit of the urine showed pus cells, streptococci, bacilli, and diphtheroids, and a culture produced *B. coli* and streptococci. Sputum showed no T.B. On July 8th—the twelfth day—5 g. of M. & B. 693 was given by mouth, with the remarkable result shown on the Chart. The temperature fell during the night, becoming subnormal next day. A blood examination on July 9th showed:—

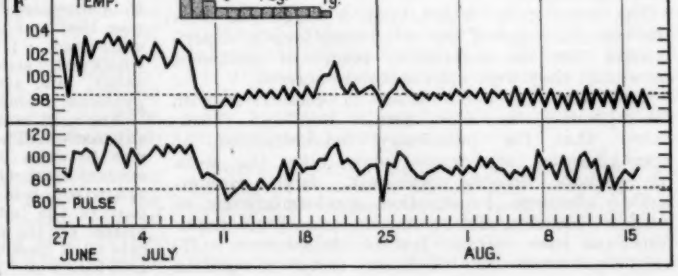
Red cells ..	3,110,000	Hæmoglobin	60%
White cells ..	12,500	Colour-index	0·97

The centrifugalised deposit from the urine showed a few pus cells only and a culture a light growth of *Staph. albus*. On this day 4 g. of the drug was given and on July 10th 2 g., when the patient had slight nausea. This was the only discomfort complained of during the treatment.

On July 11th 1·59 were given and continued daily until July 20th. Blood examination showed:—

Red cells ..	3,400,000	Hæmoglobin	60%
White cells ..	12,300	Colour-index	0·94

It will be noticed that after July 11th the temperature showed a tendency to rise and reached



101° F. on July 21st. For this rise no special cause was found, and it was followed by a fall and remained practically normal afterwards. The pleural friction was still present at the left base on July 14th, and slight conjunctival jaundice was still noted. The cardiac apical sounds were rather muffled. The patient was eating better and had no pain. A detailed blood examination on July 13th showed :—

Red cells ..	3,970,000	Polymorphs	76%
White cells ..	9,800	Lymphocytes ..	19%
Hæmoglobin ..	66%	Monocytes	4%
Colour-index ..	0·82	Eosinophils	1%

The red cells showed anisocytosis and polychromasia, with slight poikilocytosis. July 15th :—

Red cells ..	3,340,000	Hæmoglobin	62%
White cells ..	10,300	Colour-index	0·93

Blood culture sterile after 5 days' incubation. July 18th :—

Red cells ..	3,370,000	Hæmoglobin	60%
White cells ..	8,300	Colour-index	0·89

On July 22nd a rectal examination of the prostate was made. There was no enlargement, no special tenderness, it was of normal consistency, and the median groove was present.

Urine on July 23rd had no albumin, the centrifugalised deposit showed a few pus cells, red blood-cells, and granular casts ; one hyaline cast was seen. On July 25th centrifugalised deposit showed a few red blood-cells and on July 27th very numerous oxalate crystals but no red blood-cells ; no pus cells and no casts were seen on either day. On July 27th radiological examination of the frontal sinuses and antra gave practically negative results and two days later a similar examination of the teeth showed no evidence of infection. On July 28th a blood culture was sterile and the patient was sitting up in bed. Blood examination :—

Red cells ..	4,440,000	Polymorphs	50%
White cells ..	6,500	Lymphocytes ..	42%
Hæmoglobin ..	68%	Monocytes	4%
Colour-index ..	0·76	Eosinophils	3%
1 normoblast seen		Basophils	1%

On August 7th the patient was up for one hour, felt and looked well, and was putting on weight. A final blood examination on August 17th showed :—

Red cells ..	5,540,000	Polymorphs	52%
White cells ..	8,500	Lymphocytes ..	38%
Hæmoglobin ..	82%	Monocytes	8%
Colour-index ..	0·09	Eosinophils	2%

August 22nd : patient now quite recovered—arrangements in progress for a period of convalescence. August 23rd : the sedimentation-rate normal (9·2).

The fall of temperature within 24 hours of the administration of 5 g. of the drug is remarkable, and suggests the possibility of a specific action upon the organism. The rise of temperature between July 19th and 21st is difficult to account for, but in view of the uninterrupted recovery had evidently little significance.

The doses given, based upon a suggestion from the manufacturers of the drug, were largely experimental, but the satisfactory results of treatment show that they were approximately correct.

An interesting point arises in connexion with the pleurisy in this case. Bondoux (1935) noted that the pulmonary manifestations of staphylococcal septicæmia may take the form of pseudo broncho-pneumonia, large circumscribed abscesses, hepatisation, serohæmorrhagic or purulent pleurisy, and pneumothorax. These manifestations have certain features in common : (1) very slight symptoms, which may escape recognition in the absence of careful physical examination ; and (2) a tendency to subside even in cases of extensive disease. It is noteworthy, also, that multiple renal abscesses are characteristic of this disease, a point of some interest in connexion with the urinary findings in our case.

We have to thank Messrs. May and Baker for placing a supply of the drug at our disposal.

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FACIAL CARBUNCLE TREATED WITH PRONTOSIL ALBUM

A PERSONAL EXPERIENCE

With a Note upon its Effect in Lupus Erythematosus

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DURING the week June 12th to 18th I began to develop what I thought was an intranasal boil in the upper part of the left vestibule. By the 17th there was considerable swelling and redness of the left side of the nose, extending from the tip upwards for about an inch. Dr. L. Forman kindly gave me a quarter-pastille dose of X rays on the morning of that date. On the 18th the swelling had increased, there was considerable local discomfort, and I felt unwell, although I was able to play a few holes of golf in the morning. By the morning of the 19th the swelling was greater, I had neuralgia involving the ophthalmic and superior maxillary branches of the fifth nerve, and, feeling ill, I remained in bed. Dr. C. H. Ripman kindly visited me and suggested that I should take Prontosil. He gave me 10 c.cm. Aolan intramuscularly. My temperature was normal.

At 1.45 the same afternoon I took two tablets of prontosil album after a light lunch of vegetables and fruit. I dozed fitfully during the afternoon, and when I awoke the nose felt rather less swollen and painful, and the neuralgia had diminished. At about 4 P.M. I began to feel shivery. Two more tablets of prontosil were taken at 4.45 P.M. The shivering increased and lasted until about 5.30 P.M., when I began to feel hot and to suffer from very severe generalised muscular pains with headache. At the same time I was conscious of a curious tingling and itching sensation in the affected part of the nose, such as I had not previously experienced. At 6 P.M. my temperature was 101° F., and at 7 P.M. it had risen to 102°. With the development of these general symptoms the local pain and swelling in the nose seemed markedly to diminish and I could move it without discomfort.

Two more tablets of prontosil were taken at 8 P.M. At 8.30 and 9 P.M. the temperature was 103° and the muscular pains were such that I could hardly move. By 9.15 P.M. the temperature had fallen to 102° and the pains were diminishing. At 10 P.M. the temperature was 100° and the pains were much less, but I felt exhausted. I then took 20 grains of aspirin and a whisky and soda. I woke at 11.45 P.M. drenched with sweat, but, after drying myself and changing my pyjamas, I slept moderately well.

The next morning I felt better, except for extreme exhaustion. The temperature taken on three occasions was between 95° and 96°, pulse-rate 62. It was now evident that the nasal lesion was a carbuncle, as, apart from some discharge of pus from the uppermost part of the left vestibule, multiple pus-points were visible on the outside. At 1 P.M. (temp. 96°, pulse-rate 62) I took two more tablets of prontosil. I had a cold lunch at 1.30 P.M. I then began to feel hot again

(there was no preliminary stage of shivering) and experienced the same sensation of tingling and itching in the nose that I had noted the previous day, but to a less extent.

Temperature

2 P.M.	99°	2.45 P.M. ..	99°
2.15 P.M. ..	100°	3.10 P.M. ..	100°
		3.40 P.M. ..	98·4°

Two more tablets of prontosil were taken at 4 P.M., and at 4.30 the temperature was 100°. It remained at this level for a while but was normal at 9 P.M. Profuse sweating again occurred during that night, and to a less extent the following night.

As pus was forming freely on the morning after the second day's treatment with prontosil, no more of the drug was taken. Convalescence was rapid except that the asthenia persisted for several days; the blood pressure was, however, normal.

COMMENTS

I had not myself previously employed prontosil in staphylococcal infections, although I have given it in many cases of acute streptococcal infection and of chronic conditions, such as lupus erythematosus, for which I thought a latent streptococcal infection was probably responsible. The strain of *Staphylococcus aureus* with which I was infected was evidently a very virulent one. I have never before been subject even to mild staphylococcal lesions, and I am of the opinion that I caught this particular strain from a patient I had been attending who had one of the worst carbuncles that I have ever seen. Before the prontosil was taken the defensive response to the infection was poor. Locally there was a gradually increasing but indolent inflammatory swelling without any sign of pus-formation, accompanied by general malaise, out of all proportion to the size of the lesion but with no febrile response.

The effect of the prontosil was dramatic and rapid, and can, I think, only be explained by its direct action on the bacteria at the site of infection with the consequent liberation of a large quantity of toxin into the blood stream. The result was an acute toxæmia very similar to an attack of malaria, from which disease I suffered in the war—the initial stage of coldness and shivering lasting about an hour and a half, the hot and febrile stage with the temperature rising during a period of about three hours to 103° and then gradually falling, followed by the sweating stage. The severe muscular pains occurred chiefly during the febrile stage, and rapidly diminished with its subsidence. The physiological explanation appears simple. Before the prontosil was taken there was an indolent inflammatory response at the site of infection, accompanied by some absorption of bacterial toxin sufficient to cause general malaise, but insufficient to cause the intense stimulation of the adrenals and thyroid upon which, as Cramer (1928) has shown, fever depends. The sudden liberation of toxin, resulting from the action of the prontosil on the bacteria, effected this stimulation of the adrenals and thyroid to secrete, thus bringing about the initial pallor of the skin and chilliness due to intense action of the sympathetic, and later the febrile reaction. The subsequent feeling of exhaustion, subnormal temperature, and slow pulse-rate, of course, were due to temporary exhaustion of the adrenal-thyroid-sympathetic system.

It is interesting to compare the response to prontosil on the second day with that on the first. The six tablets taken on the first day had doubtless acted upon the majority of bacteria, liberating their toxins. Consequently the reaction provoked by the prontosil taken on the second day was much less severe. There was no initial shivering, no muscular pains, and the temperature did not rise above 100°. Nevertheless the temperature did rise from 96° to 99° within half an hour of taking two tablets, and to 100° a quarter of an hour later. It had fallen to normal about an hour and a half later but rose again to 100° within half an hour of taking two more tablets.

Other points of interest are, first, the curious sensation of tingling and itching that occurred at the site of infection after taking the prontosil on both days, it being much more marked on the first day; secondly, the diminution of the feeling of tension and swelling in the nose, noticeable even after the first dose of prontosil and becoming more evident after the second; and, thirdly, the apparent hastening of pus-formation by the drug.

A discussion of the mode of action of prontosil and allied compounds would be out of place here. The experimental work of numerous investigators is briefly summarised in a brochure by Bayer Products Ltd. (May, 1938). Reference must, however, be made to the observations of Whitby (1938) upon the effects of 2-(*p*-aminobenzenesulphonamido) pyridine (M. & B. 693) on the various types of pneumococci in experimental infections in mice, and to those of Telling and Oliver (1938) in a case of massive pneumonia, Type III, in which the same drug was employed therapeutically. These observations showed that the drug exerts an action on the capsule of the pneumococcus, causing it first to become swollen and crenated, and later to disappear entirely. As pointed out in an annotation in the *Lancet* (1938, **1**, 1402), Levaditi and Vaisman (1935) suggested that prontosil acts on hæmolytic streptococci by preventing the formation of capsules, thus rendering them susceptible to phagocytosis.

Although unsupported by any bacteriological investigations, this view is consistent with the clinical observations made in my own case. It seems clear to me that the prontosil rapidly attacked the staphylococci at the relatively small and localised site of infection, presumably destroying their capsules and thereby suddenly liberating a quantity of virulent toxin which produced the systemic effects of considerable severity already described and discussed. Moreover the drug would seem to have aided phagocytosis, since pus-formation, which had not been evident, was freely established by the morning after the first day of treatment.

It might be suggested that the phenomena described were the result of the intramuscular injection of aolan, and not due to the prontosil, but I think this view is untenable for the following reasons. I have a long and wide experience of treatment by injections of large doses of aolan both in staphylococcal and streptococcal infections, and I have never observed reactions in any way comparable to that which I experienced. The patient, from whom I believe I contracted my infection, and whose carbuncle was far larger than mine, received daily injections of 10 c.cm. aolan with amelioration of the local and general conditions but without any evident reactions. Moreover the mild but definite and comparable reaction of the second day's treatment with prontosil in my own case can only, I think, be attributable to this drug and explained as I have suggested.

POSTSCRIPT (Sept. 2nd).—A patient, whom I saw on August 31st with an ordinary intranasal boil, developed the same symptoms in much milder form than my own as a result of taking M. & B. 693. He had two tablets thrice daily for two days. His temperature was normal before treatment, but after

the first dose he began to feel shivery and this was succeeded by a feeling of heat. Unfortunately he forgot to take his temperature on the first day, but on the second it rose to 100·5° F., and reached this point again by midday on the third day, on which no tablets were taken. After the first day's treatment the swelling of the nose and accompanying neuralgia had almost subsided, and he telephoned to-day to say that the local symptoms had disappeared without any discharge of pus.

NOTE ON LUPUS ERYTHEMATOSUS

For some time past I have treated certain cases of lupus erythematosus, in which I believed that a chronic and latent streptococcal infection was responsible for the eruption, with prontosil. I referred to these cases in the correspondence columns of the *British Medical Journal* (1937, **2**, 774; 877), but at that time I had changed my original view as to the cause of the severe febrile reactions provoked by the drug in several patients. I am convinced now that the original view was correct—namely, that these reactions are due to the liberation of toxin by the action of prontosil upon streptococci (or possibly other organisms) in latent foci. For if, after suitable intervals of abstention from the drug when the reactions occur, it is again taken, the reactions become progressively less until it is tolerated without any ill effects. The reactions, when severe, are exactly similar in their symptoms to that experienced by myself—namely, fever (in some cases over 103°), preceded sometimes by shivering; generalised "rheumatic" pains; and night-sweats, with subsequent exhaustion. In some patients there has been a temporary focal reaction in the patches of lupus erythematosus. The diminution in the intensity of the reaction when the treatment is resumed is comparable to that observed in my own case on the second day. Occasionally a generalised scarlatiniform erythema has been observed during the height of the reaction, but it rapidly disappears and does not recur with subsequent exhibition of the drug.

It is clear that these symptoms, including the scarlatiniform erythema, are not caused by the direct toxic effect of the drug, since they cease to occur when its administration is continued. The only logical conclusion is that they are due to liberation of bacterial toxin. The results of the treatment have been very promising, but it is too early yet to decide whether permanent cure has been achieved.

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THE LANCET 100 YEARS AGO

Sept. 15th, 1838, p. 862.

From a lecture by Dr. G. G. Sigmond.

Dr. Johnson has observed, in his "Life of Akenside," that "a physician in a great city seems to be the mere plaything of fortune; his degree of reputation is for the most part casual: they that employ him know not his excellence; they that reject him know not his deficiencies. By any acute observer who had looked on the medical world for half a century, a very curious book might be written on the fortune of physicians." This observation of the great moralist is, alas, too frequently verified; we find individuals, possessing no qualifications save those of impudence and self-possession, carrying away the honours and the profits of the profession, whilst the man of real talent, of deep learning, and enthusiastic love of science, passes unnoticed and unheeded by.

THE IMMUNOLOGICAL CONNEXION BETWEEN BURNS AND SEPSIS

By W. Howard Hughes, M.B. Lond.

Assistant in the Institute of Pathology and Research, St. Mary's Hospital, Paddington

Previous in-vitro experiments (Hughes 1937) have shown that blood-serum or inflammatory exudate from febrile patients reduces the bactericidal power of normal blood to which it is added, whereas normal blood-serum or a non-inflammatory transudate has no such effect. This being so, it seemed interesting to see whether such exudates, injected into animals together with micro-organisms, would give rise to more extensive lesions, or kill with a smaller dose, than would normal serum with the same organisms. To test this various strains of staphylococci were injected intradermally into rabbits, and streptococci and pneumococci intraperitoneally into mice. The fluid used was chiefly the exudate from blisters in cases of burns and scalds; it will be called "blister fluid" throughout this paper.

BLISTER FLUID AND NORMAL SERUM WITH STAPHYLOCOCCI

(Intradermal Injection)

The skin of a rabbit's back was shaved and epilated with barium sulphide paste at least two hours before it was required for the experiment. Progressive tenfold dilutions of an 18-hour culture of staphylococcus were made in saline. A volume of each of these dilutions was added to an equal volume of blister fluid, and 0·1 c.cm. of the mixture injected intradermally. A similar series, substituting normal serum for the fluid, was injected on the other side of the animal's back; control injections of the fluid and serum alone were also made. The doses of cocci ranged from 2 to 20,000; these were too small to give any reaction in the absence of fluid.

Results.—The lesions produced are shown in Fig. 1. The control normal serum, alone or with staphylococci added in this concentration, evokes little or no reaction. When a potent blister fluid is used there is a reaction at the site of the inoculation, due to the fluid alone; this consists of a raised red area limited to the injected site. It appears after about two hours and begins to fade after eighteen to twenty hours. Where virulent staphylococci are injected with the fluid the lesions begin to extend after about twenty hours, and necrosis and hæmorrhage may take place, even with very weak suspensions of the organisms.

The extent of the reaction depends on two factors: the potency of the fluid and the virulence of the organism. The potency of blister fluid depends on the age of the burn and also on the time allowed to elapse between drawing the fluid and injecting it into the animal. The fluid is without effect for at least the first two hours after the burn, the source of the most potent fluid being a burn or scald that has had no treatment and has been left for twelve hours or more. The fluid rapidly loses its potency outside the body, so that if kept overnight even in the ice-chest it is practically inert.

The full picture of necrosis and hæmorrhage is given only by virulent staphylococci. *Staphylococcus albus* from a normal skin gave only redness, not differing from the control; one from an acne pustule and *S. aureus* from a mild cystitis gave redness and hæmorrhage but no necrosis.

BLISTER FLUID AND NORMAL SERUM WITH STREPTOCOCCI

(Intraperitoneal Injection)

Groups of mice were injected with 0·1 m.l.d. (minimum lethal dose) of a culture of streptococci mixed with 0·4 c.cm. of blister fluid, and compared with similar groups having the same dose of organisms with normal serum. The streptococcus used was only weakly pathogenic for mice, 1 m.l.d. being equivalent to 0·2 c.cm. of an 18-hour culture in broth. The fluid alone was injected to confirm that it was not itself fatal in the doses used.

Only those mice dying of septicæmia within seven days were included; those dying after this, or those developing abscesses, were excluded, although the proportion was higher among the test animals than among the controls.

Results.—Typical results are shown in Fig. 2. This represents two actual experiments, one using fluid from a blister, the other using fluid from a pleural effusion. It will be seen that the mice that have had the organisms together with blister fluid die in greater numbers than the controls that have had the normal serum with the same dose of streptococci. The experiment also suggests that though pleural exudate lowers the resistance it does so less than blister fluid. The normal serum or the hydrocele fluid used in the controls may be omitted, or replaced with saline, without altering the result.

This experiment was repeated with pneumococci. They gave a similar, but less clear-cut, result.

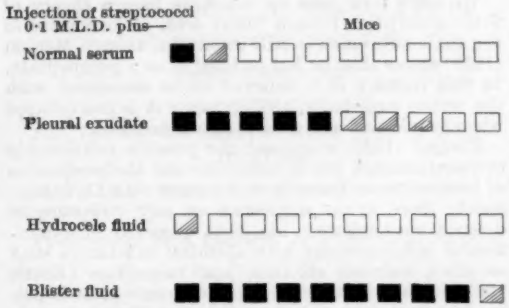

FIG. 2.—Four groups of mice (10 in each group) received injections of 0·1 M.L.D. of streptococci mixed with various fluids. A black square represents a death and a half-hatched square represents illness. The experiment demonstrates the specially lethal effect of blister fluid.

DISCUSSION

These experiments show that the blister fluid from burns contains a substance which lowers the resistance of animals to certain pathogenic organisms. This confirms the previous work in which it was shown that blood-serum and exudates from patients with active inflammatory conditions, when added to normal blood, lower its bactericidal power.

The significance of such a substance, particularly in burns, is considerable, since it helps to complete the picture of the pathology of burns, already made clearer by Menkin's work on the capillary permeability substance and by the observations of Wilson and his collaborators (1937–38) on the substance responsible for shock. It is by no means proved that the three properties of blister fluid—antibactericidal, shock-producing, and vasodilator—are all possessed by the same chemical substance, but there is no doubt that the fluids used in all three series of experiments were essentially the same, and it would not be surprising to find that the same substance is responsible for all three effects.

The essential signs and symptoms of burns are shock, fall of blood pressure and diminution of blood volume, local inflammation, and a predisposition to sepsis. They are theoretically accounted for if we postulate the production of a substance (or substances) having the following properties:—

(1) It should cause a fall of blood pressure and, in a great enough concentration, death from shock. Such a substance has been demonstrated (Wilson et al. 1936–37).

(2) It should permit increased fluid loss from capillaries and so a diminution of blood volume. Such an action is possessed by the blister fluid, and to a less extent by the blood-serum, of the patient with burns.

(3) It should also produce the picture of inflammation at the site of the burn. The fluid has been shown to produce not only vasodilatation but also emigration of the leucocytes (Menkin 1936 and 1938), and such inflammation was shown in the control injections of blister fluid in my first experiment.

(4) It should promote invasion of the site by micro-organisms. In this paper it is demonstrated that the fluid has this property too.

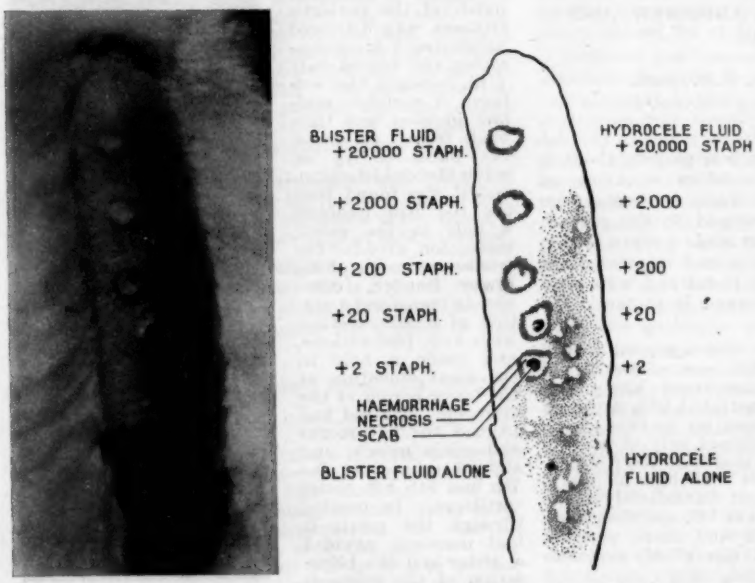

FIG. 1.—Back of rabbit showing on the left injections of staphylococcus and fluid from a burn, on the right the same dilutions of staphylococcus and normal serum. The two fluids alone commence the series at the bottom.

We have now data on which to base a theory of toxic absorption from a burnt area. The nature of the toxic substance is still uncertain, though Menkin (1938) states that he has isolated it as a polypeptide. In this country it is believed to be associated with the serum euglobulin, and certainly it is precipitated when tannic acid and similar agents are used.

Findlay (1928) examined the possible relationship of vasodilatation due to histamine and the localisation of lesions due to bacteria and viruses. In his experiments there is no suggestion of any "rupture of defence mechanisms," like that observed in experimental inflammations with chemical substances such as silica, calcium chloride, and turpentine (Kettle 1927) or the substance described here. It is hoped in a further paper to show the part played by this substance in the spread of tuberculous lesions.

SUMMARY

The blister fluid from burns contains a toxic substance which lowers the resistance of animals to certain pathogenic organisms.

Experiments show that such fluid makes the skin of a rabbit more susceptible to staphylococci. Mice are made more susceptible to streptococcal and pneumococcal septicæmia.

These observations fit in with the results of other experimental work on burns.

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Clinical and Laboratory Notes

INJURY BY A STEEL ROD PIERCING PERINEUM, ABDOMEN, AND THORAX

By E. H. Hambly, M.B. Lond.

HOUSE SURGEON, METROPOLITAN HOSPITAL, LONDON

A LAD aged 15, an engineer, was playing about in an outhouse with six of his fellow workmen on June 16th of this year; for a wager he swung from one beam to another and dropped to the ground. As he dropped one of his mates made a move at him with a steel rod five feet long and it pierced his perineum. A bystander pulled it out and with good sense tied a piece of string round it to mark the depth of entry.

Half an hour later the boy was admitted to the Metropolitan Hospital under the care of Mr. R. A. Ramsay. The steel rod accompanied him; the mark indicated that it had penetrated to a depth of 18½ in. and it was blood-stained up to this mark. He was not shocked and complained only of pain in the left side of his chest, asserting that the rod had pierced his "chest from below" though no mark was at first visible on the chest immediately after admission. His temperature was 98° F. and the pulse-rate 96; respirations were 22 and there was no hæmoptysis. Examination of the chest revealed no abnormal signs.

The patient pointed to the region of the left 6th interspace as being the site of the pain, and after half an hour a hæmatoma became evident at this point 2½ in. from the mid-sternal line. The abdomen moved normally with respiration, but there was slight rigidity of the left epigastrium and hypogastrium. No dullness to percussion nor evidence of free fluid nor hæmorrhage was found. The perineum showed a small punctured wound, ¼ in. to the left of the anus, which was punched out and corresponded with the end of the steel rod (Fig. 1). A small quantity of blood exuded from this wound. Neither rectal nor proctoscopic examination however showed any evidence of damage to the rectal mucous membrane, and on catheterisation there was no blood in the urine.

FIG. 1.—Point of entry of the rod.

The steel rod was 5 ft. long and circular in section, with a diameter of ⅜ in. With this in view, and the fact that pulse-rate was rising, operation was undertaken 1½ hours after admission. A probe was first directed up the perineal wound and was found to pass along under the rectal mucosa. A small incision was then made over the thoracic hæmatoma, and a circular patch of the patient's trousers was delivered measuring ⅜ in. in diameter and buried only ¼ in. beneath the surface. A complete midline incision was then made from 1 in. above the pubis to 1½ in. below the xiphisternum, and it was found that the rod had punched a hole in the pelvic mesocolon, abraded the transverse colon at its lower border, completely transfixed a portion of small intestine, with two perforations, and made a hole in the great omentum at the lower border of the stomach. The rod had pierced the left rectus abdominis muscle and slipped anterior to the 7th and 6th left costal cartilages. In passing through the pelvis it had narrowly avoided a ureter and the bifurcation of the common iliac arteries.

FIG. 2.—The abdominal wound and the rod, showing the length that entered.

The above damage

was repaired, there being almost no bleeding. The abdominal wall was closed without drainage and also the thoracic wound, and the patient made an uninterrupted recovery. The post-mortem-like abdominal wound (Fig. 2) and the chest and perineal wounds all healed by first intention.

My thanks are due to Mr. R. A. Ramsay and to Dr. Philip Hamill for permission to record this case and help in doing so.

ACUTE NON-SUPPURATIVE THYROIDITIS

By Min Sein, M.B. Calcutta, M.R.C.P.

CAPTAIN, I.M.S.; PHYSICIAN TO THE GENERAL HOSPITAL, RANGOON, AND LECTURER IN MEDICINE IN THE BURMA GOVERNMENT MEDICAL SCHOOL

THE statement that only 54 cases of acute non-suppurative thyroiditis have been published [1] leads me to record the following:—

A Kachin male aged 25, a sepoy in the Burma military police, was admitted to the military police hospital on Sept. 1st, 1935, suffering from fever of two days' duration with rigors. The blood smear showed benign tertian parasites. The temperature was 102·2° F. and the pulse-rate 90. Apart from fever he complained of intense sore-throat. This was found to be congested. Neither the spleen nor liver was enlarged. The usual alkaline and quinine mixtures were prescribed and the throat was painted with Mandl's paint. The temperature kept above 101° F. till Sept. 4th when it came down to normal. Coincidentally there appeared a hard painful and somewhat tender swelling between the larynx and the anterior margin of the right sternomastoid in the region of the thyroid gland. The patient had several attacks of epistaxis the same night and again on Sept. 10th. The tumour rapidly increased in size and was painful and tender but there was no fluctuation. It moved up and down with the laryngeal cartilages on deglutition. The trachea was pushed a little to the left side. There was no dyspnœa or aphonia, but there was slight dysphagia on swallowing solid food and the patient complained of discomfort and pain on turning his head from side to side. The tumour reached its maximum size on Sept. 6th, and it remained more or less stationary for about ten days. There was slight fever after Sept. 5th and the patient was afebrile from Sept. 12th. On that date the tumour was hard, hot, and painful, and the patient appeared ill and weak. After this it gradually subsided and he was discharged on Oct. 4th, 1935, practically cured.

Ordinary symptomatic treatment was given for epistaxis, including calcium by mouth. Syrup ferri iodid. was given in ½-drachm doses three times a day and hot fomentations were applied to the tumour.

No satisfactory explanation could be given of the thyroiditis in the above case. It is difficult to say whether the cause was the administration of quinine to a sensitive patient or whether the thyroiditis was the result of malaria.

[1] Giordanengo, G., *Minerva med., Roma*, 1938, **29**, 353; quoted in *Lancet*, 1938, **1**, 1144.

LECTURE ON CONTRACEPTION.—A lecture on the theory and practice of contraception will be given by Dr. Gladys Cox on Friday, Sept. 23rd, at 6 P.M., at the Walworth Women's Welfare Centre, 153A, East-street, S.E. Practical demonstrations will also be given on Friday, Sept. 30th, at 6 P.M. and at 7 P.M. The lecture and demonstrations will be open to medical practitioners and to all students who have completed their gynæcological course. Tickets should be obtained in advance from the centre.

BRITISH MEDICAL ASSOCIATION

THE PLYMOUTH MEETING

(*Concluded from p. 625*)

SECTIONS OF OBSTETRICS AND PUBLIC HEALTH

A JOINT meeting of these sections was held to discuss the

Prevention and Control of Puerperal Sepsis

with Dr. W. ALLEN DALEY in the chair. Recent litigation about puerperal infection, in which £3500 damages were awarded against a doctor on a charge of negligence, lent point, he said, to the discussion.

Prof. R. W. JOHNSTONE (Edinburgh), in opening, said that two types of organisms had to be guarded against: First, those commonly found on the skin, clothes, and instruments, for the most part anaerobic and non-hæmolytic streptococci, staphylococci, and coliform organisms which gave rise to infection after labours involving tissue damage. Secondly, there was the hæmolytic streptococcus; it was more deadly, it attacked also women delivered spontaneously, and among recently delivered women was as contagious as small-pox. Almost never present in the birth canal before labour it was conveyed by droplet infection, usually from without, sometimes from the patient herself. The danger of such conveyance was not limited to those with recent infection of nose and throat; some 7 per cent. remained carriers of infection after an attack, and the carrier-rate was higher, nearer 30 per cent., when colds were rife. Everyone in attendance on a parturient woman should cover nose and mouth with a mask; those who had been in close contact with a case of puerperal infection should be examined bacteriologically and excluded from obstetrical work so long as they were found to be infective. During antenatal care septic foci should be treated and the very real danger of marital intercourse during the later months of pregnancy should be explained to the patient.

Evidence was accumulating that the incidence of infection was lower in hospitals with careful bacteriological control than in district practice. Prof. Johnstone was therefore in favour of institutional delivery except where the home conditions were really good. He thought that one individual, the resident medical officer in larger hospitals and the matron in the smaller ones and in homes, should be charged with the responsibility of notifying doctors in charge of patients of all cases of puerperal infection. During the conduct of the labour aseptic and antiseptic technique should be combined; the strict observance of a careful technique was more important than the particular antiseptic used. The only alternative to a mask was to conduct the labour in absolute silence, but even so an unexpected cough or sneeze might betray the most devout trappist. The speaker used Dettol blue for the disinfection of the vulva and for indicating the area treated. Judged over one year he had had some success in the use of sulphanilamide as a prophylactic. When pyrexia occurred the patient should be isolated, a high vaginal swab sent to a bacteriologist, and any carriers excluded. Although logically those starting on midwifery should be swabbed, the full application of present bacteriological knowledge might almost paralyse the work of the hospitals as well as that of the single-handed practitioner.

Dr. R. M. FRY (London) enumerated the six organisms concerned in the more severe forms of puerperal sepsis: (1) hæmolytic streptococcus (Lancefield's Group A, more rarely Groups B, C, and G being rarer), (2) anaerobic streptococci, (3) *B. coli*, (4) staphylococcus, (5) *B. welchii* and other spore-bearing anaerobic bacilli, (6) pneumococcus. Of these the anaerobic streptococcus, *B. coli*, and *B. welchii* formed a group normally present in or near the genital tract but only multiplying where there had been severe trauma, or where membranes or placental tissue were retained. From the legal point of view, proof of transmission of these organisms from patient to patient would be hard to obtain since they were so often normally present. In contrast, the hæmolytic streptococcus had not been found in the normal vagina before delivery and even patients from Queen Charlotte's isolation block invariably gave negative swabs four weeks after discharge. The infections therefore by hæmolytic streptococci, which caused some 70 per cent. of fatal puerperal sepsis, were practically all introduced from without during labour or the early puerperium. Close coöperation between obstetrician and bacteriologist were, he thought, essential in the prevention of infection. In every case of puerperal pyrexia a swab from the vagina (not the cervix or uterine cavity) should be taken; the evidence of streptococcal infection so obtained was usually definite, the organisms being present either in large numbers or not at all, while clinical observation could not indicate the type of infection accurately. Only when streptococcal infection was found was it necessary to hunt for the infecting agent; then the patient, her attendants, and other contacts should be swabbed. Typing of the organism prevented unnecessary suspension of nurses from work. At Queen Charlotte's a service for examination and typing of swabs was available but more laboratories were needed throughout the country so that practitioners could be sure of accurate, cheap, and quick reports.

Dr. A. MASSEY (Coventry) dealt with the administrative aspect. He referred to the improving standard of midwives' practice, to the proposed restriction of the lists of doctors to be called to assist midwives, and to the present drift towards institutional treatment which was causing overcrowding. It might be more important, he thought, to have ample isolation accommodation for cases of puerperal infection than hospitals for small-pox. From the administrative point of view laboratory facilities were important. Good nutrition and education had their value in reducing infection.

Dr. ETHEL CASSIE (Birmingham) gave a full account of the technique for preventing sepsis. The provision of dental clinics was necessary, she said, in connexion with antenatal care; provision of cheap dentures encouraged the women to have decayed teeth extracted. Sources of infection in the patient or her relatives required attention and the general resistance of the anæmic or badly nourished patient needed building up. Doctor and midwife should regard their own health as an important factor and those with a septic condition of any kind should feel bound to avoid midwifery. In a midwifery service a sufficient number of relief midwives must be available. Dr. Cassie described precautions taken at two maternity homes, one of which had had 518 deliveries in a year without a case of notifiable pyrexia; gowns and masks were worn by all attendants making contact with the patient, boiled bed-pans were used on every occasion, beds and bedding were disinfected after each case, and dusting performed by damp mops. District nurse-midwives should, she thought, be freed from midwifery beyond attendance on abortions.

LEGAL RESPONSIBILITIES

Dr. R. W. DURAND (London and Counties Medical Protection Society) said that in private practice, whether consultant or general, the doctor was required he said to exercise reasonable care and skill whatever the disease, but what might be considered such to-day might to-morrow be considered negligence. Now it was the exception for practitioners to wear masks and gloves when attending confinements; in five years' time failing to do so might be considered negligent. Legal standards could never require the attainment of medical ideals. Prof. Johnstone had pointed out that to apply fully all the knowledge available might be so impracticable as to paralyse the work. It was for this purpose, he submitted, that the word reasonable had been used to qualify the care and skill that had to be exercised; the definition would depend on the common practice of the time. The circumstances in which a doctor could be charged with malpraxis, that is in failing to give reasonable care and skill, might apply not only to his care of an individual case but also to the question of transmitting infection to others. If it were shown, for example, that it was within his knowledge that he might be carrying infection, either from another patient he was attending or through having himself recently suffered from sore-throat, and that he had not taken sufficient precaution against transmitting such infection, it was possible he might be held to have acted negligently.

Those employed by a hospital or other authority to attend persons in or about the time of their confinement were in the same position so far as the exercise of professional skill was concerned. Though a patient might bring an action against the employing authority the latter would almost certainly enter a defence that it had fulfilled its obligations by employing a fully qualified person. Many authorities, an increasing number since the Marshall *v.* Lindsay County Council case, required their medical employees to be members of a recognised protection society. It is the duty of a practitioner in administrative charge of an institution to see that the conditions were such that safe midwifery could be conducted therein. If he was placed in a supervisory capacity over the nursing staff he must see that they exercise proper care and skill and must, if he thinks advisable, close or advise his authority to close the institution or certain wards until such time as danger of infection has passed. He was not responsible for the actions of other practitioners attendant upon cases in the home unless he had distinct authority over them. He should however, in event of infection, see that other practitioners admitting new cases were acquainted with the facts, so that they might consider whether they would advise their patients to enter, even though the authorities had not closed the institution.

Dr. Durand, who had been asked about the responsibilities of an M.O.H. in regard to the outbreak of puerperal sepsis in maternity homes or nurses, quoted a memorandum from the Ministry of Health to the effect that the M.O.H., on hearing of an outbreak of any infectious disease of a dangerous character, must visit the spot at once to make inquiries and take such measures as he was authorised. He could of course delegate certain of his responsibilities to, say, a senior assistant M.O.H. or medical superintendent. The practitioner should issue specific instructions not only for guidance but for his own defence; if

he had issued specific instructions to a midwife or nurse he could be held responsible if she failed to carry them out provided that he had exercised adequate supervision and not condoned an omission. If he felt that a home should be closed, it was his duty to make that recommendation.

The position in regard to cottage hospitals and the smaller voluntary hospitals was more difficult. Dr. Durand submitted that it was the duty of the practitioner with the infected case in hospital to inform his colleagues of the fact. He considered it was also the duty of every practitioner to satisfy himself that the conditions in a particular institution were such that he could safely admit cases. Strictly speaking, he should satisfy himself before admitting each case, but in practice it would be sufficient if he had satisfied himself that he would be informed by the matron or some other person; the position was akin to that of a doctor delegating the removal of stitches; if it was his regular practice and he had given instructions to some skilled and capable person the nurse's failure to carry out the instructions would be her own responsibility.

DISCUSSION

Dr. GREENWOOD WILSON said that in the Cardiff municipal hospital new patients were not admitted to a ward where a case of puerperal sepsis had been until ten days after the removal of the infected patient. Puerperal septic cases were nursed in the side medical wards under the care of gynæcologists. In view of the risk of air-borne infection antenatal clinics should not, he thought, be conducted in the room used for minor ailments or child welfare. If only it were possible to immunise against puerperal sepsis and so simplify the very elaborate system involved in prevention.

Prof. W. C. W. NIXON (Hong-Kong) recommended the wearing of adequate masks, the use of dettol, and the avoidance of overcrowding. Despite statements to the contrary, the hæmolytic streptococcus was virulent in tropical areas.

Sir EWEN MACLEAN (Cardiff) hoped the discussion would serve to refresh knowledge rather than set up a standard of method; so much depended on the individual circumstances. The variation in the status of the medical officer of health was so rapid as to be disruptive; the vast majority of these officers made coöperation easy but there were some who gave no help to the practitioners. Local authorities could have that reduction in maternal mortality which they were willing to pay for.

Dame LOUISE MCILROY (London) agreed on the importance of raising the resistance of the patient. The patient should be seen early in pregnancy and not lost to the sight of the same person until after delivery. Relatively too much had been said about masks and too little about bed-pans; few hospitals had the mattresses disinfected when the occupant of a bed was changed.

Mr. L. C. RIVETT (London) suggested that the doctor should wear a mask and gloves while attending cases, such as whitlow and otorrhœa, to protect himself from infection. The report on swabs should be available quickly. Dental caries, which had been blamed, was caused by a hæmolytic organism of no importance in the causation of puerperal sepsis; pyorrhœa and gingivitis were in a different category.

Dr. J. W. G. RIDDELL (Plymouth) agreed with Dr. Fry that the mother should be investigated before the nurses as a source of infection. As there was evidence that transient bacteræmia occurred when an osteomyelitis was opened, he had made a practice of giving sulphanilamide some 20 minutes before big interference to counteract any analogous condition.

Dr. F. E. CAMPS (Chelmsford) mentioned one unfortunate result of litigation; hospitals were now insuring themselves against that risk and were feeling relieved of responsibility.

Dr. LEWIS LILLEY (Leicester) wondered how often the judge's direction that patients should be warned of recent infection was being carried out.

REPLIES

Prof. JOHNSTONE expressed a hope that the discussion had served as an account of reasonable procedure rather than as a standard. He thought that nurses should be swabbed without waiting for the report on the patient. He could not see who other than the matron could be responsible for notifying practitioners of the presence of fever.—Dr. FRY said that pathologists could give a report on a swab by the following morning.—Dr. CASSIE thought the practitioner most concerned should be in charge of the notification.

SECTION OF ORTHOPÆDICS

AT a meeting of this section the chair was taken by Mr. C. M. KENNEDY (Plymouth), and Mr. K. O. CLARKE (Manchester) opened a discussion on

Fractures Involving the Knee-joint

Fractures of the lower end of the femur and of the upper end of the tibia, and involving the knee-joint, had, he said, become commoner in recent years. (Patella fractures were excluded from the discussion.) Of these the injury most often found was fracture of the external tuberosity of the tibia, the cause of which is suggested by the American term "bumper fracture." In a total of 13,844 fractures at one hospital with which he was associated, 94 were fractures into the knee-joint (excluding patella fractures). Of these, only 20 involved the femur and 74 the tibia, 48 being fractures of the external tuberosity. There were, in this series, 15 fractures of the tibial spine with avulsion of a fragment of the upper end of the tibia. This fracture appeared to be peculiar to young subjects between 10 and 20, and responded perfectly to manipulation without open reduction. It was, in his opinion, produced by severe pressure, forcing the femur back on the tibia, with the knee-joint in flexion. After reduction the limb was put in plaster from hip to ankle, leaving the ankle-joint and foot free. The patient walked from the beginning.

There were in his series only five examples of fractures of both tuberosities. The radiological appearance of such fractures suggested that extension of the limb would easily reduce the deformity. In practice, such reduction was not at all easy, the tilting of the external tuberosity being particularly obstinate. Fracture of the internal tuberosity alone he found to be extremely rare. Fractures of the external tuberosity were of three types. The first was a vertical fracture, with spreading outwards of the fracture line. This was reducible by extension, combined with lateral compression. In the second type, the tuberosity was depressed and comminuted, and he thought the treatment of this type was quite unsolved. The third type was a depression en masse of the tuberosity, combined with either fracture or dislocation of the upper end of the fibula. Mr. Clarke suggested that comminution of the external tuberosity might be attributed to impaction against the head of the fibula in cases where the fibula did not break.

This would account for the fact that comminution of the internal tuberosity was never found. There was evidence that the external cartilage was torn in some instances. Open operation was commonly necessary in the worst of these fractures and his practice was to have the limb prepared for open operation, to attempt reduction under X ray control first, and, if this failed, to open the joint. Even then it might prove too difficult to reassemble all the tiny fragments. He used a redresser to apply lateral pressure. In the application of traction the ilio-tibial band was brought into action. After reduction, the limb remained in plaster-of-Paris for at least three months.

DISCUSSION

Mr. C. E. KINDERSLEY (Bath) emphasised the importance of aiming at perfect alignment of the joint surface in these fractures. His method of reduction was, first, the application of traction, until distraction of the fracture had mobilised all the fragments as completely as possible. He then applied circular compression with an Esmarch's bandage, and impacted the fracture with a few lateral blows with a hammer. He had had success with this method.

Mr. A. M. A. MOORE (London) said that he reserved open operation in knee-joint fractures for the exceptional case. His practice was to aspirate if the joint was very distended, to apply traction, varying the direction of the pull with the direction of the deformity, and to combine this with a form of lateral compression. The traction was applied by means of a Kirschner wire and was left on for some weeks before applying plaster. In about 6000 new fractures in the three small hospitals with which he was associated, he had found 31 knee-joint fractures, 10 femoral, and 19 tibial, 7 of the latter being fractures of the external condyle.

Dr. JOSEPH S. BARR (Boston, U.S.A.) said that in fractures of the external condyle with downward tilting, open operation was the method of reduction. He used a long vertical incision, running just lateral to the patella, deliberately exposing the articular cartilage and the upper end of the tibia, and the whole fracture site. He then built up the smooth articular cartilaginous surface bit by bit, and filled in below with the fragments, pushing the large fragment up into position by hand. He immobilised the limb and kept his patient in bed till the stitches were removed, and after ten days applied a Thomas's splint for four weeks. He allowed no weight-bearing for ten weeks. The operation could be done on fractures seen late, but did not then give such good results. It was only applicable for true "bumper" fractures with a large external fragment.

Mr. KENNETH PRIDIE (Bristol) said that one of his chief troubles in these fractures was to account for, and to treat, the persistent hyperæsthesia which occasionally followed. He liked to treat fractures involving the knee-joint in a skeleton splint that allowed early movement.

Mr. S. T. IRWIN (Belfast) said he was glad to have Dr. Barr's operation to take back with him for these very difficult cases. He thought a moderate bow-leg was not a disability, while with a genu valgum a patient could not work. The ligaments almost always remained intact.

Mr. CLARKE, in reply, said that his only fear of Mr. Kindersley's method was of possible damage to the external popliteal nerve. He had seen Dr. Barr perform his operation, and it was a good one. He warned surgeons, and especially younger surgeons, against subjecting old and feeble patients to long and trying methods of reduction. The hyperæsthesia described by Mr. Pridie was one of the worries of his life.

Acute Anterior Poliomyelitis

Miss M. E. FORRESTER-BROWN (Bath) gave an account of the diagnosis and treatment of this disease. It was very necessary, she said, to diagnose the milder attacks, because they might be followed by the most severe paralysis. An undiagnosed febrile attack, followed by a sudden exertion of a damaged group of muscles, might be followed by permanent paralysis. The abdominal pain and distension could be mistaken for appendicitis. She had seen several cases of onset with arthritis and fluid in a joint. She believed that some latent infections were lit up by overheating, as might happen in sun-bathing. With an irritable and struggling child who did not use one limb, the diagnosis was almost obvious. In treatment she preferred the Jones's frame to a plaster bed. It was less frightening for the patient, and nursing was easier. She had designed a celluloid apron to control the abdominal muscles and prevent herniæ at the inguinal regions. Scapular weakness was often overlooked; and the small muscles—e.g., of the thumb and foot—needed as careful attention to prevent overstretching as did the larger muscles. Lumbar puncture was not often necessary, but it might be a method of reducing irritability due to increased cerebro-spinal tension.

Mr. H. J. SEDDON (London) preferred the plaster bed, which allowed individual adaptation. He had been anxious to discover the correct period of isolation for the disease. As it was variously given as 3 months, 3 weeks, and 3 days, he had fallen back on his original practice of a 4 weeks' isolation period.

Dr. D. C. BROWN (Melbourne) spoke of his experience of the epidemic in Australia. Serum he had found to be quite useless. Osteomyelitis had proved one of the pitfalls in diagnosis. Muscle charts were a most important part of the routine of treatment.

Mr. CLARKE doubted whether any harm could arise from allowing daily movement of a paralysed limb through its whole range.

Mr. L. O. BETTS (Adelaide) was impressed with the importance of preserving some degree of flexion of the spine to prevent abdominal troubles during treatment.

Miss FORRESTER-BROWN, in reply, condemned all electrical methods of treatment.

Spinal Manipulation

Mr. GEOFFREY LILLIE (Exeter) said he admitted all his patients for spinal manipulation to hospital for two or three days, and did the manipulation under full anæsthesia. Afterwards they were taught spinal exercises, and were seen one day each week to control the treatment. Of 82 patients in whom a follow-up had been possible, 35 were found to be cured, 21 improved, and 19 unchanged. The lumbo-sacral region was the commonest site of pain and stiffness. Of 61 lumbo-sacral cases, 8 were cured immediately, 20 after a varying period of delay, 19 were improved, and 14 unchanged. He found it extremely difficult to decide which patients were likely to benefit from treatment. In reply to Dr. Barr, he said that of 16 cases of sciatica he had had one immediate cure.

Inguinal Gland Biopsy

Mr. SEDDON spoke on the value of this method in the diagnosis of tuberculosis of the knee-joint. Patients with tuberculosis of joints were now being

sent so early that it was often impossible to establish a diagnosis. Biopsy was practised by some surgeons, but it held the danger of sinus formation. The rich lymphatic plexus that surrounded the synovial membrane of the knee-joint probably drained into the inguinal glands, and the finding of an infected gland in a suspected tuberculous arthritis was presumptive positive evidence. In 10 such cases in which the glands had proved negative, the joints had cleared up and had never shown signs of tuberculosis. In 17 subsequently proved to be tuberculous arthritis the glands were positive in 14. He agreed with the criticism that we still did not know what to do when the glands proved negative. The patients, as before, had to be treated as suspect. Section of the glands removed had proved to be quite as reliable as guinea-pig injection. He did not think that biopsy of the synovial membrane was completely reliable.

REVIEWS AND NOTICES OF BOOKS

1. American Illustrated Medical Dictionary

Eighteenth edition. By W. A. NEWMAN DORLAND, A.M., M.D., F.A.C.S., Member of the Committee on Nomenclature and Classification of Diseases of the A.M.A. Philadelphia and London: W. B. Saunders Co. 1938. Pp. 1607. 30*s*.

2. American Pocket Medical Dictionary

Sixteenth edition. Same editor and publishers. Pp. 973. 8*s*. 6*d*.

3. Dictionary of Scientific Terms

As used in the various sciences. By C. M. BEADNELL, C.B., F.Z.S. London: Watts and Co. 1938. Pp. 235. 5*s*. A cheaper edition at 1*s*.

1. ONE cannot judge a dictionary by merely turning over its pages. It is a piece of apparatus that must be tested by long experience and constant use. "Dorland" is one of those works of reference which has already justified itself by time and usage. It is scholarly, accurate, and comprehensive and within its scope is unlikely ever to let its user down. It is a standby in this office. One who handles it for the first time may be assured of finding answers to queries which may long have been troubling him; he can learn, for example, what are cellobiose, aleuronat, and rhodan, who was Blaud and where is Javelle.

There are words like blepharopachynis (meaning a thick eyelid) and gastralgokenosis (a pain in the empty stomach) which, we imagine, are reserved for the use of medical lexicographers in their own homes. On the other hand we could find no "elegant variations" (as Fowler calls them) for such useful conceptions as a thick ear or a pain in the neck. If there are happy words such as *vitamin* there are also distinctly unhappy ones such as *jecorize* ("to impart to a food the therapeutical qualities of cod-liver oil"). Among more spectacular ones, if only in virtue of their length, are *cholecystelectrocoagulectomy* and *mesencephalohypophysial* which might with advantage be cross-indexed under tests for drunkenness. A useful feature of the dictionary is the attention given to the names of proprietary products, their composition being indicated as far as possible. But would it not add to the usefulness of the book if the names of the makers were added? There can surely be no ethical objection to this. The reader often wants the information and even from the point of view of formal lexicography a proprietary word seems as incomplete without its proprietor as a book without its author. For example, to describe a *tabloid* as "a form of medicinal tablet or lozenge. A proprietary word" is unnecessarily mystifying. It also escapes mention that *Cellophane* is a proprietary name, at least in this country.

2. Those who find the larger Dorland more than sufficient for their purpose will welcome the new (16th) edition of the Dorland's American Pocket Medical Dictionary. It is without the illustrations of its larger companion and the entries are fewer and shorter, but it is an admirable little book and contains an astonishing amount of well-condensed information.

3. This dictionary of scientific terms is a new and useful reference book. It is a small glossary of words used in general science and it is published at the low price of 5*s*. So far as one can judge it is entirely reliable, the words being most carefully selected and defined with precision. Even Homer must sometime nod and Mr. Beadnell's full title—a "Dictionary of Scientific Terms as used in the various sciences"—contains the only tautology to be found in the book.

The Hypothalamus

Morphological, Functional, Clinical, and Surgical Aspects. By W. E. LE GROS CLARK, D.Sc., F.R.C.S., F.R.S., JOHN BEATTIE, M.D., D.Sc., GEORGE RIDDOCH, M.D., F.R.C.P., and NORMAN M. DOTT, F.R.C.S. Edinburgh: Published for the William Ramsay Henderson Trust by Oliver and Boyd. 1938. Pp. 211. 12*s*. 6*d*.

FROM the time when the epidemic of encephalitis lethargica unmasked certain of its functions the hypothalamus has been a subject of special interest not only to neurologists but to general clinicians. In the four lectures here collected the researches of recent years are summarised and discussed. Prof. Le Gros Clark gives a useful and well-illustrated account of the structure and development of the hypothalamus and of its comparative anatomy amongst the vertebrates. It is of interest that the structure in reptiles approaches the mammalian pattern, that of amphibia being somewhat less complex than in the fishes. Mr. Beattie writes on the physiology of the hypothalamus which, as he says, is the "physiology of the internal environment." Maintenance of constancy in this sphere is controlled by the autonomic system which, as is now generally agreed, has its headquarters in the hypothalamus. But whether function may be spatially subdivided amongst the different nuclear centres described by Le Gros Clark or whether Beattie's subdivision into a posterior portion coördinating sympathetic reflexes and an anterior coördinating parasympathetic reflexes remains to be seen. In correlating these first two lectures the reader is left in doubt as to the presence and significance of the suprachiasmatic nucleus in man. Beattie (p. 94) says that it may control the secretion of intermedin; Le Gros Clark (p. 17) says that it can hardly be said to be present at all in man. Dr. Riddoch's chapter on the clinical aspects of hypothalamic derangement is a masterly survey within a small compass. Its interest is enhanced by notes of his own cases and of others lent to him by colleagues. Mr. Norman Dott illustrates his lecture on the surgical aspects of the hypothalamus with a detailed account of four selected cases of suprasellar cyst upon which he has operated. In suggesting that such tumours produce lesions in the adjacent brain

solely by compression of the local blood-vessels he neglects the effect of direct pressure with resulting degeneration and gliosis. Doubtless, however, the two factors are inseparable in their action. His speculative comments upon hypothalamic function and disturbances thereof by tumours run somewhat parallel to those of Riddoch's and serve to show how much remains to be elucidated in this fascinating sphere. The Henderson Trustees have earned the gratitude of the medical profession by arranging to issue this lavishly produced book at such a modest price.

Oreille interne

Étude anatomo-pathologique et clinique. Technique histologique et expérimentale. Second edition. By CH. CLAOUÉ. Paris: N. Maloine. 1938. Pp. 227. Frs.30.

THIS book, which appeared ten years ago, has been republished unaltered except for one short additional chapter. This is on the technique of operations for meningitis due to infection from the labyrinth; Dr. Claoué emphasises the importance of making a free opening after labyrinthectomy through the bony wall separating the cochlea from the internal auditory meatus in order to secure the best possible drainage. The first and most important section of the work provides a precise account of the minute anatomy of the internal ear and of its clinical significance in disease. The author describes the bony capsule of the labyrinth as containing two layers, the enchondral and the periosteal, implicated respectively in otosclerosis and in inflammatory processes. He proceeds to the perilymphatic spaces and the aqueductus cochleæ, with especial reference to the paths of invasion in suppurative disease, the endolymphatic spaces of the membranous labyrinth, and lastly to the internal auditory meatus, emphasising its importance in the propagation of suppuration to the meninges. The second section of the work is devoted to the methods devised by the author and others for the preparation of specimens and sections of the internal ear, with a useful chapter on artefacts and post-mortem changes; and there follows a description of the general and microscopic anatomy of the ear of the guinea-pig, which the author favours for experimental work on account of its resemblance to the human ear.

It is to work on the pathological anatomy of the ear that we must look for progress in our knowledge of the diseases of this organ, and this well-illustrated monograph will be useful to the research worker and stimulating to the clinical otologist.

Practical Otology, Rhinology and Laryngology

Third edition. By ADAM EDWARD SCHLANSER, M.D., Colonel, Medical Corps, United States Army; Chief of the Eye, Ear, Nose, and Throat Service, Letterman General Hospital, San Francisco. London: Henry Kimpton. 1938. Pp. 315. 21s.

Colonel Schlanser has written this book primarily as a guide and medium of reference for the use of army medical officers. As a lesion does not come under notice as an acute otitis media or an acute pharyngitis but rather as an ear-ache or a sore-throat, he has tried to group some of the diseases under symptoms. This results in a rather clumsy arrangement which has not been adopted for diseases of the ear and has not been consistently maintained even in the chapter on diseases of the nose. These are partly classified under such overlapping headings as nasal discharge, pain and nasal discharge, chronic nasal discharge with or without pain, and chronic nasal discharge with nasal obstruction. One of the difficulties in writing a book of this kind, which the author has not entirely surmounted, is to assess the amount of knowledge (1) needed by (2) already in the possession of the men for whom it is intended. Here the preliminary chapter on examination of the patient is insufficient as a guide to those not familiar with the procedures. Tonsillectomy is very well and fully described, as is the treatment of reactionary hæmorrhage after this operation; but suture of the pillars over a roll of gauze as here recommended is unnecessary and the gauze quickly becomes foul. Colonel Schlanser believes that the greatest factor in the prevention of colds is the removal of tonsils and adenoids in children and of the tonsils in adults, and that next in importance come the eradication of sinus disease and the correction of deflections of the septum; one would welcome a warning that slight deflections are extremely common, and that resection is justified only when they really interfere with respiration or ventilation of the nares. The account of acute suppurative otitis, its complications, and its treatment is reliable, though the omission of the sulphanilamide group of drugs from a volume dated 1938 is hardly excusable. A useful section is that on the detection of feigned deafness. In the full account of hay-fever and allergic rhinitis there is no mention of the use of ionisation or the galvanocautery; drops of 0·5 per cent. cocaine with ephedrine and adrenaline are recommended, and the same solution is advised in the treatment of an acute cold. It is remarkable that syphilis is said to be very rare both in the nose and in the throat, a fact which seems to point to careful early treatment of this disease in the United States army. Rather too much space has been allotted to rare conditions, such as cerebro-spinal rhinorrhœa, and to plastic operations for deformities of the nose, which army officers are not likely to have to perform. The book should prove stimulating and useful to industrial medical officers in charge of large groups of employees as well as to those in military service.

Le bacille de type bovin dans la tuberculose humaine

By Dr. MARCEL GERVOIS, Ancien Interne des Hôpitaux de Lille. Lille: Imp. L. Danel. 1938. Pp. 314. Frs.100.

THIS is essentially a work of reference, being a synopsis, mostly in tabular and statistical form, of the world's literature on the bovine tubercle bacillus as it affects man. The bibliography contains over 470 references, beginning with the earliest studies of Theobald Smith and Koch and ending with the most recent ones of Griffith and Jensen. The introductory chapters on the biology of the bacillus summarise most of the important work on the isolation of the organism by culture and animal inoculation, including that done not long ago by Petroff and others on the dissociation of cultures. In this connexion a chapter on atypical and mixed strains, based on the original work of the British Royal Commission, is especially welcome. The formulæ of most of the standard media are given but accounts of animal inoculation methods are condensed to a minimum. The chapters on the prevalence of the bovine bacillus in the lesions of man as recorded in various countries are the most enlightening in the book, though both the choice of material and method of investigation must have

varied a good deal in different records and some of them are very old as bacteriological records go. The results of 17,000 tests collected from more than 200 published articles are summarised in seven large tables on folding sheets—a monumental piece of industry. These tables give an incidence of the bovine bacillus in human lesions ranging from 1·7 per cent. in Hungary to 20·7 per cent. in Scotland. Next to Scotland the most significant figure is that of 13·9 for Denmark, a country of dairy industries. It will probably surprise most readers to find that in the United States the figure is as high as 11·7 and in Canada as low as 2·0; incidentally both these countries lay great stress on pasteurisation. The percentage for England is 10·4; there appear to be no separate figures available for Wales or Ireland. A similar statistical investigation has been applied to milk sample testing for the bovine bacillus. Here again a strict comparison of the figures for the different countries is not really possible since the principle of selection for examination—e.g., bulked and single cow, pasteurised and special grades of milk samples—has obviously varied. The Scottish data, for example, include a large number of tuberculin-tested samples in which tubercle bacilli are only occasionally found. For Great Britain and Ireland the number of samples recorded is 75,134 with 6·9 per cent. of positive findings as against only 5075 (8·7 per cent. positives) for the Continent of Europe. Indeed throughout the book the vast array of figures shows how much more thoroughly Great Britain has investigated the bovine tuberculosis problem than any other country. The reader is left with the impression that many countries must have really little idea of the incidence of bovine tuberculosis. Dr. Gervois pays little attention to the abattoir side of the question, where again Great Britain has been a pioneer. A short chapter on the legislation in force in various countries for the control of bovine tuberculosis in man concludes the book, which will save students of this disease an immense amount of preliminary labour, even if it only serves to convince them that there is no hope of finding material for international comparison.

Practical Bacteriology, Hæmatology and Animal Parasitology

Ninth edition. By E. R. STITT, M.D., Sc.D., LL.D., P. W. CLOUGH, M.D., and MILDRED C. CLOUGH, M.D. London: H. K. Lewis and Co. 1938. Pp. 961. 30*s*.

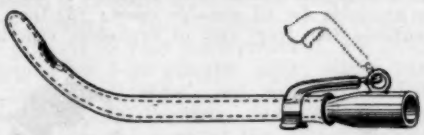
"Stitt" has for long been the one book essential to any laboratory carrying out routine investigations of pathological material. In this new edition special attention has been paid to considering laboratory data in relation to the clinical picture. The 95 pages devoted to hæmatology contain the best available description of blood diseases in a short space and puts many a larger book to shame. It is concise, up to date, well illustrated, and readable. The biochemical sections have been carefully revised. A section on acid-base equilibrium has been included in the chapter on blood chemistry, which, although not a comprehensive statement of present knowledge, should serve the needs of the average medical reader. Recent advances in the study of the ductless glands are discussed and the best known tests for pregnancy are detailed. Modern views on the deficiency diseases are briefly surveyed in a chapter on the vitamins, but the developments in the chemistry of both endocrines and vitamins are ignored and their physiology is treated too sketchily. The methods of blood and urine analysis here given are for the most part well-tried procedures in common use and are so clearly described and explained that those with little biochemical experience should be able to follow them. There is a mistake on p. 674 in the account of the phosphatase method: the "standard phenol solution and reagent" should be prepared with *diluted* phenol reagent and not with undiluted as here stated. The concise notes on the significance of biochemical findings are particularly good. The sections on practical bacteriology and mycology have been considerably enlarged. New chapters have been included on the filtrable viruses and the fungi, and those on immunity and hypersensitiveness, the serological tests for syphilis, the spirochætes, and the rickettsias have been largely rewritten. Useful tables are supplied on the diagnosis of infectious diseases by animal inoculation and on the diseases which may be contracted from domesticated animals. Other parts of the book are less satisfactory and some chapters seem to have been very inadequately revised. For example, in the chapter on streptococci no mention is made of the serological grouping of hæmolytic streptococci, while that on corynebacteria makes little or no reference to recent work on the different types of *C. diphtheriæ*. Some of the criteria included in the key to the identification of different groups of bacteria are of doubtful value, and the classification used is partly obsolete.

It would be ungrateful to emphasise defects which are few in number and of little moment compared with the wealth of accurate information in this classic text-book.

NEW INVENTIONS

ANTRUM CATHETER

FOLLOWING an intranasal antrostomy it occasionally happens that the opening made heals rapidly and tends to close. I have had made for me a rubber catheter which I slip over a thin antrum cannula



and put on the stretch with the clip attached. This I insert into the antrum, remove the clip, and withdraw the cannula. The rubber catheter expands, stretches the opening, and remains in position.

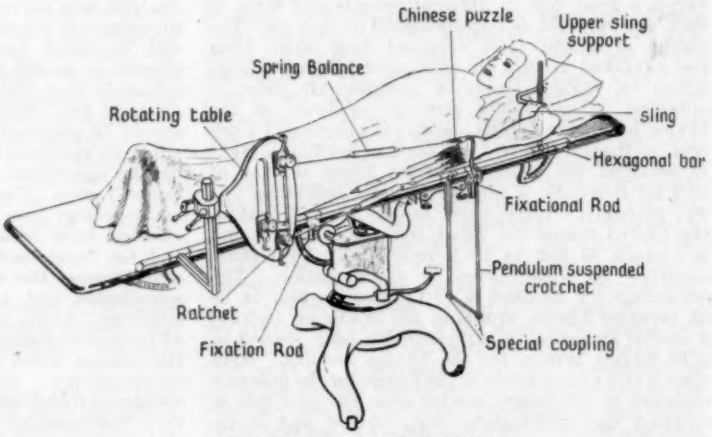
The instrument has been made for me by Messrs. John Bell and Croyden, Wigmore-street, London, W.1.

C. HAMBLEN-THOMAS, F.R.C.S.
Surgeon, Ear, Nose, and Throat Dept., West London Hospital.

FOREARM TRACTION MACHINE

THIS machine has been designed for the reduction of difficult forearm fractures and dislocated semilunars, the traction being applied without the use of pins, callipers, or wires. The whole apparatus is attachable to and forms a unit with the operating table. Extension is through Chinese puzzles by means of three sliding ratchets operating independently. The ratchets are mounted on a rotating table and spring balances are incorporated between them and the Chinese puzzles. The pull on the thumb is single and on the fingers paired and we have been using a

total pull of 40 lb. for 15–20 minutes in the case of adults. Counter extension presented an easier though difficult problem and was eventually solved by utilising a sling, the horizontal supports of which are detachable. A plaster applied up to the axilla includes the sling and when the case has set the detachable supports are slid out leaving the sling behind. The further difficulty of supinating the forearm could not be overcome by the turning table and a crotchet-shaped rod attachable to the suspension bar as an upside-down pendulum easily permits the hand to be kept in any position and does not interfere with the horizontal traction.



The extension apparatus applied.

Traction of this type has been accepted as a practical desideratum and the value of Chinese puzzles confirmed by others working independently. The apparatus is simple and easy to use and its results have been highly satisfactory.

We are grateful to Mr. Hugh Carson of Selly Oak Hospital, without whose help we would not have been able to utilise the apparatus in practice. Our thanks are also due to the Medical Research Council for their grant which enabled the work to be done, mainly in the mechanical engineering department of Birmingham University.

M. S. HOLMAN, M.B. Lond.
Resident Medical Officer, Birmingham Dispensary;

F. H. BODEN, B.Sc.
Lecturer on Machine Design, University of Birmingham.

A DEVICE FOR NASAL ADMINISTRATION OF OXYGEN

THE value of intensive oxygen therapy in certain respiratory and cardiac conditions is now accepted. For this purpose the oxygen tent is probably the most efficient means of administration. There are, however, certain drawbacks to the use of oxygen tents: (1) they are expensive, notably in institutions where a large number may be required if they are to be available for all suitable cases; (2) they are not entirely free from risk of explosion, especially

if a naked light is brought near; and (3) many patients dislike intensely being closely surrounded by the walls of the tent. This claustrophobia is more common in dyspnœic patients.

For these reasons other methods of oxygen administration which will overcome these objections are being sought. Marriott and Robson (*Brit. med. J.* 1936, **1**, 154) have shown that by the use of bilateral nasal tubes of small calibre the alveolar oxygen content can be maintained at 42 per cent. if 12 litres of oxygen are allowed to flow through the nasal tubes per minute. The method suggested by Marriott and Robson has one disadvantage—the use of a webbing band which passes around the head. When worn for any length of time this causes discomfort and occasionally intense headache owing to the constriction.

To overcome this objection a catheter carrier incorporated in a spectacle frame has been made for me which has now been in successful use over many months. This carrier, like the Marriott-Robson one, supports two catheters of common cycle valve tubing, each 3½ in. long. These are carried by two light and malleable silver tubes attached to the periphery of the lens frame from the hinge of the side pieces to the lowest point on the periphery. They then pass downwards and forwards and, being flexible, are easily adjusted beneath the nose to suit individual requirements. Fine pressure tubing is attached to the opposite ends and coupled to the combined flowmeter and humidifier through a small metal "Y" piece. When the patient already wears spectacles, a modification of the device permits the oxygen-carrier to be clipped on to them so that patients can retain their own lenses.

The carriers are made in sizes suitable for adults and children and of course involve the use of a flowmeter with a safety-valve to prevent the bottle or tubing from bursting if any part of the apparatus should become obstructed or the oxygen is turned on too rapidly.

I should like to express appreciation of the trouble taken by the makers of the carriers, the Oxygen Therapy Equipment Ltd., of 33, Devonshire-street, W.1, in the several alterations necessary to produce a satisfactory apparatus.

A. TUDOR EDWARDS.

THE LANCET

LONDON: SATURDAY, SEPTEMBER 17, 1938

THE FLAT ARCH

FOR some time past the prevalence of flat-foot among children in their teens has engaged the attention of the school medical service, especially in Kent.[1] The condition, it seems, is causing anxiety in present-day Germany. A census of recent recruits for the Hitler-Jugend has revealed[2] the fact that more than 70 per cent. of them, boys and girls alike, show evidence of foot strain and are in process of developing deformities of the feet. Splaying of the foot, commencing flat-foot, and dropping of the longitudinal arch are said to be common. The disabilities due to these imperfect feet are considerable, and the young people find it impossible to stand up to the long marches and other training expected of them. Dr. MAERZ says he is concerned at the state of affairs, and at the loss sustained in military and working efficiency. Further growth may modify or correct the deformities, but unless the underlying causes are removed recurrence is likely in after-years. Constitutional causes may account for some cases of failure of feet under strain; but it is pretty certain that the majority of the common foot-ailments are preventable, and that they are due to the combined effect of faulty footwear and lack of development of the muscles of the foot. The importance of good shoes is not only self-apparent but has been insisted on by orthopædic surgeons for years—with how little effect a study of shop windows is sufficient evidence. Mr. W. SAYLE CREER[3] describes the essential features of a satisfactory shoe. It must, he says, grip the heel firmly and have a bar or tie which fits over and grips the instep. The heel of the shoe should not be higher than 1–1½ in., and the fore part or vamp should be a little more anatomically correct than the foot, allowing room for the toes to move about. Fitted with such a shoe the joints of the foot are allowed active movement in stepping forwards, the transverse arch can flatten and reform normally with weight-bearing, and functional activity of the muscles is preserved. It is noteworthy that Mr. CREER speaks of the arch flattening as a proper and normal occurrence. Mr. CREER says that there is no agreement on the question whether the human foot should possess an arch. Mr. A. S. BLUNDELL BANKART has long taught us to regard the flat foot as its natural attitude in relaxation. His view that the longitudinal arch is determined by muscular action is challenged by Mr. BRUCE and Dr. WALMSLEY (see p. 656) on embryological grounds; their examination of the fœtal foot has convinced them that the normal human foot is longitudinally arched. They contend therefore that manipulative obliteration of this arch is not justifiable in adolescents or young adults, but only in older people whose pain is due to adhesions associated with chronic tarsal arthritis. Surgeons who have found such manipulation successful in persons of all ages are not likely to abandon it on theoretical grounds without positive evidence that such treatment can do harm. Probably it is the *mobility* of the arches that is of most importance, and in the maintenance of this mobility the short muscles of the foot play an active part which is continually threatened by the wearing of shoes. The effect of failure of the interosseous and lumbrical muscles is well visualised by BRUCE and WALMSLEY. It could, of course, produce just that type of ugly, claw-foot deformity which is typical of the wearers of high heels, who stump along on the heads of their metatarsals, with complete loss of the spring action of the forefoot. The fully developed deformity includes hallux valgus and overlapping of the outer toes. The picture is typical also of the deformity that can be seen developing in the feet affected by acute rheumatic affections when the patients are still in bed. This similarity suggests to Mr. CREER that the injurious effect of deforming footwear is in its mechanical and vascular interference, causing separation of the attachments of the muscles and ligaments and allowing the metatarsal heads to splay out and the joints of the first toe to rotate.

If the rising generation is taught to admire as elegant the anatomically perfect foot, with uncrowded toes, a straight inner border and mobile arches, there is little doubt that the makers will produce the shoes to fit the feet. Dr. MAERZ'S solution is pressure from official quarters upon the shoe industry. His suggestions for strengthening the growing foot are more practical. He advocates skipping for 5–10 minutes daily, either barefoot or in "gym" shoes, and running barefoot on grass or sports grounds. Such exercises can be made a regular part of the school curriculum, available for all children, while courses of foot-gymnastics and massage are of more limited application. He prefers running sports to manœuvres which involve prolonged route marches and long periods of standing. One of the most serious results of prolonged weight-bearing on the "tender-foot" is fracture of one of the metatarsal bones at its neck, the so-called march-fracture. H. W. MEYERDING and G. A. POLLOCK, who have reviewed this subject,[4] can find no single predisposing cause; it is the summation of several factors which breaks down the natural resistance of the foot. Badly fitting shoes which do not grip the heel and instep, circulatory changes followed by fatigue of poorly exercised muscles and ligaments, these combine to throw a strain on a part of the foot ill-adapted passively to bear the body-weight. The fracture itself is probably always the result of a sudden sharp trauma. It may then remain unrecognised for days or

[1] See *Lancet*, 1935, 1, 840.
[2] *Disch. med. Wschr.* July 22nd, 1938, p. 1070.
[3] *Brit. med. J.* July 2nd, 1938, p. 9.
[4] *Surg. Gynec. Obstet.* August, 1938, p. 234.

weeks; even the radiogram may not reveal it until callus has formed below the stripped periosteum and decalcification shows at the site of fracture. In a discussion last February at the Royal Society of Medicine,[5] the importance of prolonged fixation in this march-fracture was demonstrated; too early return to weight-bearing may lead to its repetition in a neighbouring bone. By walking with the foot splinted in plaster-of-Paris the muscles are exercised and the circulation restored while the calcification of the bones returns to normal.

HYPERKINESIS IN CHILDHOOD

In spite of the prominence given to a few isolated questions such as the pathogenesis of chorea, little attention has been paid to the general problem of hyperkinesis in childhood. The clinical material available for such a study is vast but the pathological findings associated with it are scanty and hard to interpret. Indeed little assistance is to be expected from morbid histology, since most hyperkinetic manifestations in early life are transitory. On the other hand hypotheses derived from physiological experiments and from psychiatric studies have not been wanting. Any comprehensive analysis of the varied hyperkinetic symptoms loosely classed as "functional" must include an attempt to evaluate rival theories, and to estimate the extent to which they may be reconciled and assimilated, and few have the impartial outlook necessary for this task. Emil v. Lederer and Julius König of Budapest, in one of the valuable monographs which appear from time to time as supplements of the *Archiv für Kinderheilkunde*,[6] present a critical review first of the physiology of movement in infancy and childhood, and secondly of all varieties of hyperkinesis met with by the clinician. The analysis of the development of motor mechanisms and the characteristics of movement at successive ages emphasises a number of points which are too often forgotten, such as the small degree of cortical influence operating in early childhood, and the fact that a certain superabundance of movement (which adults other than adoring parents are apt to find irritating) is entirely physiological in the pre-school and early school years. The infant is a "thalamo-pallidal being," and the transition from this stage of development to the greatly reduced motility of the second decade takes place at varying rates, and is liable to periods of temporary arrest or even regression. This mechanism underlies the conception of "erethismus," the term employed by the authors to include all forms of hyperkinesis in which the movements are generalised, excessive, but in themselves physiological. Such a classification may well be an advance on those based on subjective distinctions such as "purposeless" and "purposeful." Erethism may occur in association with a number of cerebral disorders of known pathology (malformations, hydrocephalus, encephalitis) as well as in a larger number of children in whom no physical disease is present ("Hypermotilitätsneurose"). These children are of normal intelligence, but the maturation of their motor functions has been delayed or impaired. The clinical features of the erethism however are identical in all these types, and the nature of the case can only be determined by the presence or absence of signs of neuronic disease. The authors are inclined to follow those who would place the disturbance of function in subcortical or extrapyramidal neurones.

Distinct from the generalised hyperkinesis of erethism is the more highly differentiated group which includes tics and compulsion movements. Such spasmodic movements may occur in association with cerebral disease, especially encephalitis, or in its absence. Generally speaking they are more likely to be due to psychogenic factors than are the generalised movements; tics often have symbolic significance, the underlying clinical condition being one of anxiety or of widespread obsessional symptoms. In general they do not however respond readily to psychotherapy.

In considering the motor mechanisms involved in disturbances of this kind and in choreiform movement and athetosis, German neurologists are much more ready than British ones to attribute obscure derangements of movement to striatal and extrapyramidal disturbance. Perhaps too much stress is laid here on arguments drawn from analogies with encephalitis, for this disease involves many areas apart from these neurones. On the other hand too little attention is paid to the light thrown on involuntary physiological movements by work on conditioned reflexes, and to the indication which they yield of a transcortical rather than an infracortical disturbance of function.

PUBLIC HEALTH IN BRITISH COLONIES

Reports of dissatisfaction and distress in some of our colonies have aroused public interest in their administration and especially in the measures taken to preserve public health. Attention has been called especially to the meagre standard of living in the West Indies, to dire want among the inhabitants of St. Helena and to the prevalence in British African dependencies of tribal customs which may involve the coercion of native women into marriage. The governors or deputy-governors of nine of the African colonies, replying to an official inquiry on this last subject, are unanimous in regarding such coercion as rare and in emphasising the dangers of hastening by legislation the gradual emancipation of women from parental control.[1] When the position of African women was the subject of discussion three years ago Prof. W. M. Macmillan emphasised the paramount need of increased expenditure of time and money on their education, especially in matters of health. In his view the primary cause of the backwardness of Africa is ignorance of the

[5] See *Lancet*, 1938, **1**, 387.
[6] *Arch. Kinderheilk.* 1938, Suppl. No. 16.

[1] Correspondence relating to the Welfare of Women in Tropical Africa, 1935–37. Cmd. 5784. H.M. Stationery Office. July, 1938. Pp. 35. 9*d*.

elementary rules of hygiene. He has since expanded this thesis in a survey of social, political, and economic trend in British Africa.[2] He speaks with the authority of 20 years' experience of native policy in the self-governing dominion of South Africa and his anxiety is that the ten British colonies should as far as possible avoid the mistakes made in the Union. While pleading for gradual rather than sudden changes, he is critical of the current theories that native culture should remain largely undisturbed. In primitive Africa famine and disease are common terrors, witchcraft may take possession of one's nearest kin, and for help tradition offers only superstitions that aggravate misery and fear. Prof. MACMILLAN has found no reason to believe that any African people wants to be left as it is; against the fear and insecurity of primitive life unaided Africans have shown themselves powerless. On the other hand he has no patience with those who regard European enterprise as the only effective means of developing Africa, and the Africans themselves as tools to serve this end. In his view the benefit of our own industrial classes and of the native races is only to be served by concentrating on the task of fitting the African peoples to stand alone.

He is on strong ground when he argues that the urgent need for action in the realm of public health touches the policy of "indirect rule" at its weakest spot. Respect for native custom must not deter us from imposing at least the practical rudiments of western science on superstitious Africans. Not that this is proving to be a simple task. To the variety of tropical diseases prevalent in Africa must be added most of the maladies common in this country; and the inquiries now being directed by the Colonial Office to native diet and nutrition are likely to reveal deficiencies not easily remedied. The scope of the work before the officers of the Colonial Medical Service is thus already wide and Prof. MACMILLAN envisages its vast expansion. Nigeria, he says, contains one doctor to every hundred thousand of the population of twenty millions, and he makes honourable mention of a solitary officer coping with the health of a district with an estimated population of half a million. He discusses the conditions offered to the medical officer on whose zeal so much depends, with special concern lest the privilege of private practice allowed to members of the Service in some places may lead them to neglect public duties which should absorb their whole time and energy. He suggests that the time has come to revise the regulation permitting them to supplement their salaries in this way. Needless to say that the General Medical Council, to whose intervention he attributes this regulation, has no influence over such matters. It was discussion between the Colonial Office and the British Medical Association in 1920 and 1926 that led to the agreed formula now in force. No officer is entitled, as of right, to private practice, the Service being envisaged as essentially one of whole-time officials whose primary duty is to the State. The conditions, if any, under which officers are permitted to engage in private or consulting practice, and to receive fees from members of the public, are determined by local regulations. Prof. MACMILLAN does not, of course, suggest that so slight a change would affect the magnitude of the problem, and actually the removal of any privilege without compensatory advantages would be a tactical error at a time when the Service has special need to enlist the best men and women available. The Colonial Medical Service in its present form is only four years old. Its unification was a landmark of the gradual amalgamation of the various departments of the Colonial Service of which the story is well told by Mr. CHARLES JEFFRIES.[3] He computes the number of its employees at present as 200,000, of which 600 (the figure given in THE LANCET Students' Guide is 700) are qualified European medical men and women. A study of their conditions of service suggests to an impartial eye that, quite apart from the question of private practice, certain adjustments would do much to attract the type of candidate likely to make the most of great opportunities. At present the successful candidate, after a subsidised course at a school of tropical medicine, is given a post on an initial salary which varies, with the size or site of the Colony to which he is appointed, from £500 to £700. Since 1934 a certain amount of interchange has been possible between Colonies and officers have now more chances of varied service. But it seems a pity that some form of unified salary is not devised, with special allowances for climatic conditions. Under the present system if a man is offered a post in one of the smaller colonies and refuses it he may not for a long time get an appointment in one of the larger and more remunerative ones and, if he does get one later, loses so much seniority. The Colonial Office is generally willing to help an officer by payment of fees, allowances, and extra leave to take special courses, but though the Service to-day, as Mr. JEFFRIES notes, has many specialist officers, most of its members find that in practice they are unable to train themselves in a specialty. Mr. JEFFRIES explains how much has been done to level up pensions in the last few years; the aim now is to make a flat rate of 1/600th of the officer's final pensionable emolument for every month of his service. When this system is universally adopted men who have served a large part of their time in the smaller colonies will no longer suffer any hardship. The policy of confidential reports (pp. 122–123) also appears to need reform. An officer unfortunate enough to incur the displeasure of his chief may never have the opportunity of refuting or even of hearing the details of an adverse report. All he will know is that the way of promotion is suddenly blocked. The Army rule insisting that an adverse report should be

[2] Africa Emergent. By W. M. Macmillan. London: Faber and Faber. 1938. Pp. 414. 15s.

[3] The Colonial Empire and its Civil Service. By Charles Jeffries, C.M.G., O.B.E., Assistant Secretary in the Colonial Office. Cambridge: At the University Press. 1938. Pp. 256. 10s. 6d.

shown to the officer concerned is a much fairer one.

If we emphasise the few defects rather than the manifest advantages of a Service which offers such fine opportunities, it is because of the need to enlist men and women of vision as well as competence for posts in the Colonial Medical Service. Prof. MACMILLAN has shown that it is essential to allocate much more money to health services and the persons guiding such expenditure must be not only sympathetic to the aspirations and prejudices of the people they serve but ready first to learn and then to teach their native assistants effective methods of propaganda. It is clearly to the speeding up of the development of educational and social services in our colonies, especially those concerned with nutrition and general health, that future policy must be directed.

ANNOTATIONS

ABUSE OF HOSPITAL CONTRIBUTORY SCHEMES

THE rapid growth of hospital contributory schemes is one of the most notable of the post-war social changes in this country. The contributors are now numbered by the million and are steadily increasing, and their contributions form an important part of the annual income of the voluntary hospitals. It was hoped that the schemes would regularise hospital attendance and prevent "hospital abuse," but from the discussion on the subject at the Annual Representative Meeting of the British Medical Association this year it seems that the hope has not fully been realised. At the end of the discussion a resolution was carried without dissent stating that hospital contributory schemes had hindered the normal development of private practice and of Public Medical Services, and asking the council of the Association to review the whole position regarding contributory schemes and report thereon. In the discussion it was said that largely owing to the schemes hospitals were displacing instead of supplementing private practice and were used by persons well able to pay ordinary professional fees. Dr. Peter Macdonald, however, pointed out that such abuses are not countenanced by those responsible for the management of contributory schemes. He read extracts from a memorandum adopted by the Association of Contributory Schemes last year stating that "steps should be taken to ensure that contributors who are able to pay for their treatment privately should not seek free medical treatment at voluntary hospitals through the contributory scheme." The adoption of an income limit is recommended by the B.M.A. to prevent hospital abuse, but according to Dr. Macdonald about a third of the contributory schemes are without income limits. Among these is the Sheffield and District Association of Hospital Contributors, which at a meeting held on Sept. 6th considered a memorandum from the Sheffield Hospitals Council stating that though the scheme was based on a "gentleman's agreement" in lieu of an income limit there had been less abuse than in many places where income limits had been adopted, but that there had been some abuse of the hospitals by highly paid contributors. In the memorandum it was suggested that such contributors should not claim any direct benefit, but should regard their contributions as a means of supporting the voluntary hospital system. If they applied for the free facilities available at the consultative out-patient department, they would be asked to satisfy the almoner that the treatment required could not be obtained elsewhere. Contributors on the financial border-line might be asked to pay for the advice of a consultant, but if institutional treatment was required they would, on admission, receive free treatment, it being "left to each contributor's sense of conscience and sportsmanship whether he should apply for the free facilities." Though the chairman proposed the acceptance of the memorandum it was rejected by a large majority of those present on the ground that all contributors should be treated alike. Further discussions are to be held with the Hospitals Council, and their outcome will be of more than local interest.

MEDICINE AND LAW IN THE ANTIPODES

DURING the years 1933 to 1936 the Medico-Legal Society of Victoria held many productive meetings and have now issued [1] for circulation among members a collection of the addresses delivered. A High Court judge leads off with an admirable paper on "science and judicial proceedings"; other legal members discuss such topics as divorce and witchcraft, and the medical members, who form the majority of contributors, deal with subjects as interesting in England as in Australia. Among these Dr. Gerald Weigall, speaking of law and disease, emphasises the impracticability of enforcing or obeying an over-elaborated code of public health. After specifying the superlatively hygienic requirements of Australian law in such matters as the conduct of a boarding-house, the storage of food, and the cleanliness of barbers' shops, he observes that, while all these restrictions exist, an unqualified man may give medicine and be paid for the medicine a sum which includes, but does not specify, advice, if he calls himself a herbalist. And a man who has neither anatomical knowledge nor training can wrench a diseased or injured joint if he calls himself an osteopath. In the last contribution, entitled "Psychopathic Personalities and the Law," Dr. C. Farran-Ridge enlivens a learned address by deferentially offering to the legal members of the society some suggestions for the defence of shop-lifters where it cannot be denied that the accused stole the articles as alleged. All his advice, he cheerfully admits, is likely to founder on the rock of judicial incredulity; but it has the merit of expounding certain modern psychological theories of the causation of kleptomania. If the accused is a single woman, many reasons may be submitted for regarding the theft as pathological. The advocate can explain that his client suffers from kleptolagnia. She did not really wish to take the goods, but was merely seeking gratification for her sexual impulses by means of the emotional energy generated by the excitement of her thefts. If the woman is married and has no children, proceeded Dr. Farran-Ridge, the advocate can allege that her husband is, in spite of his protests, impotent. If in this case the kleptomania is due to starvation of sex instincts, a different line must be taken if she happens to be the mother of several young children. In that event the advocate had better follow the Freudians who see in weaning the root of all evil and find in

[1] Proceedings of the Medico-Legal Society of Victoria during the years 1933, 1934, 1935, 1936. Vol. II. Edited by John V. Barry, Barrister-at-law, and A. E. Coates, M.D., M.S., F.R.A.C.S. Melbourne: Brown, Prior, Anderson, Pty. 1937. Pp. 179.

"separation anxiety," arising from love privation in early childhood, the motive for all acquisitive behaviour. Did she drink a glass of milk before the theft? This would have reactivated her "weaning complex" and created such a storm in her unconscious mind that, at the time, she did not realise the nature and quality of her acts. Alternatively the advocate can rely on mental dissociation. He can urge that when the woman is her normal self (Personality A) she is as honest as the day; but when she is Personality B (as on the occasion of the theft) she behaves in a manner at variance with her real nature and has no subsequent memory of her conduct, which can be recalled to her only under hypnosis. It would be unfair to punish A for a crime committed when she was not A but B. Lastly, there is the possibility of pleading epileptic automatism. The diagnosis of epilepsy, Dr. Farran-Ridge playfully adds, has the great advantage that no evidence seems required in support of it except evidence of the crime itself. If we are charged with shop-lifting, inasmuch as we have stolen so extensively from Dr. Farran-Ridge's entertaining address, we can offer no defence at all. But at any rate our readers can be assured that the proceedings of the Victoria Society will well repay study.

COARCTATION OF THE AORTA

OF the several forms of high blood pressure, that associated with coarctation of the aorta appears to have the most obvious explanation—namely, increased resistance to the blood flow at the aortic constriction. Recent work suggests, however, that this explanation will not alone account for all the facts. In spite of the higher pressure, the blood flow through those parts of the body that are above the level of the coarctation is not increased; which means that the peripheral vascular resistance must be raised. The nature of this rise of peripheral resistance in the upper part of the body is uncertain. It could be readily attributed to the physiological regulation of blood flow by local action of tissue metabolites; but here another clinical observation raises further difficulty. In some cases of coarctation there is diastolic hypertension in the lower extremities as well as in the upper, a finding that has lately been confirmed by direct measurement of the intra-arterial pressure.[1] This indicates a *generalised* increase in peripheral resistance, and suggests a similarity between coarctation and the experimental hypertension produced in animals by compression of the renal arteries. It has been shown that in dogs partial occlusion of the aorta immediately above the point of origin of the renal arteries gives rise to hypertension, whereas occlusion below the renal arteries has no such effect on the blood pressure. Rytand[2] has confirmed these results in rats and has shown that the presence of surviving renal tissue below the point of occlusion is essential for the development of hypertension.

It appears then that coarctation of the aorta may involve three types of circulatory readjustment. Hypertension in the upper part of the body is the direct result of the aortic constriction; secondly, an increased peripheral resistance in the same areas is necessary to maintain a normal blood flow; finally, reduction in blood flow through the kidneys may lead to a generalised increase in peripheral resistance, such as follows partial occlusion of the renal arteries. It is true that all three factors will be minimised by the development of a collateral circulation, but each may contribute to the increased strain on the heart-muscle. Myocardial failure is indeed the usual cause of death, with rupture of the aorta and cerebral hæmorrhage next in frequency. The two cases, reported by Dr. Walker and Dr. Livingstone elsewhere in our present issue, illustrate these complications and emphasise the common association of coarctation with other congenital vascular abnormalities and with infective endocarditis.

[1] Steele, J. M., and Cohn, A. E., *J. clin. Invest.* July, 1938, p. 514.
[2] Rytand, D. A., *Ibid*, p. 391.

A PUBLIC SERVANT

Mr. S. J. Fraser Macleod, K.C., who died on Sept. 7th, was for many years the senior legal member of the Board of Control, from which he retired two years ago. The son of a distinguished naval surgeon, he was brought up in an atmosphere of medicine, and this background no doubt helped to establish and maintain his remarkably cordial relations with his medical colleagues on the Board. Before joining it Mr. Macleod had had a successful career at the Bar, which he abandoned for domestic reasons when, in 1908, he accepted appointment to what was then the Lunacy Commission. A sound lawyer, with the caution characteristic of his race, he acquired in the course of his 28 years of service an unequalled knowledge of the tangled mass of lunacy legislation. His colleagues remember him, Sir Laurence Brock writes, not merely for his skill in its interpretation but "as a genial and kindly friend, popular with the staff and always courteous and considerate, the pleasantest of companions on a journey, and a notable solver of the *Times* crossword puzzles. Small in stature, 'Mac' had a typically legal face, not unlike Lord Darling's, and lightened, like his, by twinkling eyes and a humorous expression. He was one of the kindliest of men, but any deliberate ambiguity or economy of truth roused in him a fierce intolerance. His standards of integrity were strict and he was incapable of those petty subterfuges which less scrupulous men excuse as diplomatic; a promise, even an implied undertaking, must be carried out whatever the cost. He made friends wherever he went and his retentive memory gave him an enviable faculty for recalling faces and names. Many of the older patients in mental hospitals up and down the country will learn of his passing with regret."

ROUTINE EYE EXAMINATION

THE importance of good sight to industrial workers would seem obvious enough, but an investigation now being carried out by the Industrial Health Research Board, with the coöperation of the National Ophthalmic Treatment Board, though not yet concluded, suggests that the vision of over 40 per cent. of workers would be improved by suitable spectacles,[1] and this corresponds very closely with the findings of the inquiry made among 200,000 workers in the United States in 1924. A questionnaire issued to employers in all classes of industry three years ago showed that an examination of the eyes before the engagement of an employee was exceptional, and periodical re-examination was carried out in only 7 out of 400 firms; in only one firm in six had any scheme been adopted whereby workers could have their eyes examined voluntarily. Much of the blame for neglect must, however, be attached to the workers themselves, for there is a popular prejudice which dies hard against the wearing of spectacles, and manual workers especially often consider them more of a handicap

[1] Report on investigations into the subject of vision in industry. National Ophthalmic Treatment Board, 148/150, Great Portland-street, W.1.

than a help. The returns made in the last four years by practitioners engaged in the National Eye Service [2] show that of those who come to them for treatment some 63 per cent. have errors of refraction only, 28 per cent. errors of refraction plus one or more "other eye conditions," of which diseases of the conjunctiva, cataract, squint, constitutional diseases and ocular affections, and diseases of the uvea head the list, and 8 per cent. have one or more other eye conditions without refractive error. The comparative frequency of conditions lying outside the sphere of the sight-testing optician again demonstrates the importance, emphasised in a recent pamphlet by the Factory Department of the Home Office,[3] that in cases of eyestrain the advice of an ophthalmic surgeon is essential.

Through the National Eye Service, which now has the assistance of 900 ophthalmic surgeons throughout the country, the advice of an ophthalmologist is available at a small fee to all insured persons and others of similar economic status, and the National Ophthalmic Treatment Board is prepared to arrange for the attendance of eye specialists and dispensing opticians at the larger factories and works. There should therefore be no difficulty in any worker obtaining treatment. Apart from the diagnosis and treatment of actual visual defects, however, spectacles have been proved to be of considerable assistance in those occupations entailing close fine work, such as mounting electrical filaments, and it may be said that where an operation is performed most easily within 10 inches of the eye, such visual assistance is definitely desirable. Further, special visual requirements are necessary in certain occupations, for example accurate colour perception in the fabric and printing trades. It would seem, therefore, that there is a good case, from the point of view of both employer and employed, for routine examination of the eyes at the beginning of employment and at regular intervals thereafter.

LEAD IN DRINKING WATER

THE action of water on lead piping used for conveying it to convenient points in dwellings has, as is well known, been a fertile source of lead poisoning; whole districts having sometimes been affected. The action is by no means well understood and the Water Pollution Research Board has for some time directed its attention to the matter. The conditions of water consumption in a household are not easy to imitate experimentally. During the night water remains in contact with lead pipes without access of air other than that dissolved in the water. This water is drawn off first thing in the morning and is probably used for early morning tea. It may contain all the lead removed by the water from the surface of the pipes. On the other hand it may not, if secondary actions have led to deposition of lead which had been dissolved. A study by Mr. H. Ingleson, D.Phil., of the action of water on lead, with special reference to the supply of drinking water, was issued by the Board in 1934 as Technical Paper No. 4.[4] Ingleson has followed this up with a paper [5] in which he describes the result of passing all the water used in a household for drinking and cooking purposes through a filter packed with a mixture of nine parts of calcium carbonate with one of magnesia, which retains practically all the lead without exasperating the housewife by getting choked at intervals. Ingleson has worked out a trustworthy analytical method in which modest amounts of lead can be determined in the presence of large quantities of calcium and magnesium. This he has done for periods up to three months, thus discovering the total amount of lead which would otherwise have been consumed by the members of the household consuming the water. By the good offices of water engineers he has been able to examine in this way the water from nine districts of supply in various parts of the country. In these nine cases he found average concentrations of lead varying from 0·004 to 0·526 parts per million. The variations did not follow a definite seasonal sequence although there was some tendency for higher results to occur in summer. Ingleson's estimate of the consumption of water by individuals, based on observation of one household, confirms that of H. E. Magee,[6] who found that the inmates of two public assistance institutions in England consumed—by drinking and in soups, stews, puddings, &c.—an average of 0·616 gallon a day for men and 0·635 for women—i.e., about 5 pints. H. V. Pedersen [7] found that an American family of seven persons used 16·1 gallons per head per day for all purposes; of this he set aside 6 per cent. for cooking and kitchen work and 5 per cent., say 1·6 gallons, for drinking. Even if Ingleson has regarded the American gallon of 8·337 pounds as equivalent to the British gallon of 10 pounds this would still work out at double the English consumption. On a basis of ½ gallon a day the consumers in the district in which Ingleson found the highest concentration of lead in the water might consume 1·5 mg. a day. It is a remarkable fact that human urine is seldom absolutely free from lead.

ARTIFICIAL ŒSTROGENS

THE injection of the follicular hormone has long been known not only to hinder the normal progress of the fertilised ovum to the uterus but to suppress endometrial proliferation and prevent implantation of the egg. If injected still later it may cause death of the embryo. Early this year Dodds, Golberg, Lawson, and Robinson reported [8] the synthesis of a substance having in many respects an action similar to that of œstradiol (or œstrone) but possibly even more potent, and the biological effects of this diethylstilbœstrol were described in our columns [9] by Dodds, Lawson, and Noble. From Germany is reported [10] a new derivative of œstradiol, ethinyl œstradiol. Both these new preparations are effective when given by the mouth, and this has now been made additionally clear by combined work done at the National Institute for Medical Research and the Middlesex Hospital and reported by Parkes, Dodds, and Noble.[11] The two new œstrogens, diethylstilbœstrol and ethinyl œstradiol, were fed to rabbits in propylene glycol solution; diethylstilbœstrol was administered to rats in oily solution by stomach-tube under brief ether anæsthesia.

The experiments were arranged in three groups. It was first shown in immature female rabbits sensitised with œstrone that the subsequent administration by mouth of either of the œstrogens greatly decreased, or in larger doses abolished, the endometrial proliferation caused by the subcutaneous injection of progesterone in oil. The next stage was to prove by laparo-

[2] *Brit. med. J.* suppl. March 5th, 1938, p. 117.
[3] Industrial Eyestrain. Form No. 1983. Home Office. October, 1937.
[4] See *Lancet*, 1934, **1**, 771.
[5] *Analyst*, 1938 **63** 546.
[6] *J. Hyg., Camb.* 1937, **37**, 30.
[7] *J. Amer. Wat. Wks Ass.* 1937, **29**, 370.
[8] *Nature*, 1938, **141**, 247.
[9] *Lancet*, 1938, **1**, 1389.
[10] *Naturwissenschaften*, 1938, **26**, 96.
[11] *Brit. med. J.* Sept. 10th p. 557.

tomy, at different periods after mating, the high normal rates of ovulation and implantation in rabbits. The normal figures having been ascertained, 7 rabbits were given ethinyl œstradiol during the first week after mating; they were killed and examined 6–9 days after coitus when progestational changes should have been well advanced. Those (4) treated for 5 or 6 days with a total dosage of 2–6 mg. showed no normal implantations and little or no progestational proliferation, though the corpora lutea in the ovary seemed normal. For those (2) which had a smaller dosage over a shorter period, implantation had not been entirely eliminated but the appearance suggested partial failure. One rabbit given intermediate dosage showed intermediate changes. In another series of 9 rabbits diethylstilbœstrol was effective, though in less degree. This drug was tried also in rats, with suitable controls, and proved to be highly potent in preventing implantation. In a third group of experiments designed to test interruption of established pregnancy, ethinyl œstradiol was given to 6 rabbits in varying dosage over a short period (2–3 days) which began 9 days after mating, the rabbits being killed a few days later. All the 30 embryos in the 5 rabbits receiving a total dose of 0·5 mg. or more of the drug were resorbed or were undergoing resorption. In the remaining animals, which received 0·2 mg., 2 live fœtuses were found in 7 implantation sites. A test on one rabbit with diethylstilbœstrol suggested that its denidatory effect is less than that of ethinyl œstradiol.

The authors add that everything known about the menstrual cycle of primates suggests that its hormonal control is the same as in the cycles of lower animals, and that it is extremely probable that the factors governing the implantation of the fertilised egg are fundamentally similar in women and other species. The experimental conclusions arrived at above should thus in their view be applicable to women, though the fact that very large amounts of œstrogen are excreted by pregnant women makes it likely that the period during which administration of an œstrogen might be effective would be relatively much shorter than in rabbits. Attention has already been called in our columns[12] to possible applications in veterinary practice and animal husbandry, where it has been shown that in many respects the action of diethylstilbœstrol qualitatively resembles that of natural œstrogens. Application to clinical medicine is in the hands of the Therapeutic Trials Committee. We are at present in the dark as to whether these synthetic products may not have other harmful effects which will impair their essential usefulness.

THE NEW MEDICAL CURRICULUM

THE *Irish Times* of Sept. 10th did a useful service in collecting and publishing the opinions of several of the leading medical teachers in Dublin on the effect that the new curriculum is likely to have on medical education and on the personnel of the profession. Fears had been expressed that the profession is overcrowded, and that young medical men find it increasingly difficult to earn a livelihood. The experience of most of the Dublin teachers does not support this view. Prof. T. G. Moorhead of Trinity College, Prof. H. F. Moore of University College, Dublin, and Prof. W. Boxwell, president of the Royal College of Physicians, were all of opinion that young medical graduates were being absorbed into the profession fairly rapidly. Prof. L. Abrahamson, on the other hand, was apprehensive that the medical profession in Ireland was approaching saturation point. All the teachers consulted were in favour of the stiffening of the medical course, and many of them—not for the first time—commented on the low standard of education of students at the time of entrance in the medical course.

THE PHARMACIST'S STATUS

THE chairman of the British Pharmaceutical Conference which held its 75th annual meeting at Edinburgh this week is one of the veterans of his calling; "it is," he said, "just sixty-eight years since I began a five years' indentured apprenticeship under a pharmaceutical chemist." Mr. Rutherford Hill has been more than an eye-witness of all the changes from the passing of the Pharmacy Act of 1868 to the framing of the Poisons Rules under the Act of 1933; for a large part of that period he was secretary of the North British branch of the Pharmaceutical Society which played a large part in moulding the statutes relating to the practice of pharmacy and in their administration. Mr. Hill's motive, in outlining the development of pharmaceutical practice as influenced by legislation and decisions of the courts, was to show that the personal qualification of the pharmacist is more important than the place where he carries on business, and he argued that the decision of the House of Lords in 1880, confirming the rights of joint-stock companies to keep chemists' shops, was not "a disaster to the craft of pharmacy" as has hitherto been supposed, but rather had the effect of giving "an enhanced status to the person who qualified." Be that as it may, there will be general agreement among pharmacists that this emphasis on the need for qualification has had a wholesome influence on the practice in hospitals and public institutions, where it is desirable that persons who dispense medicines should possess qualifications equal to those who supervise the dispensing of medicines in shops. From this point it is not a far cry to the proposition that all dispensing should be in the hands of pharmacists, "an ideal position, with which," said Mr. Hill, "we have long been familiar in Edinburgh" and one which "gets rid of the dispensing doctor and the equally undesirable prescribing chemist." Mr. Hill recalled how, as a visitor to the House of Commons in 1911, he had heard Mr. Lloyd George, in introducing the National Health Insurance Bill, declare "We have resolved that in this matter we shall adopt the practice common in Scotland, according to which the medical practitioner shall prescribe and the pharmacist shall dispense the medicine." An extension of this principle to all medical prescriptions would, said Mr. Hill, be the attainment of the objective aimed at by the founders of the Pharmaceutical Society in 1841. Looking forward he asked what is to be the position of the pharmacist in any future scheme for a coördinated National Health Service? In all schemes of health service which have been proposed specific places are found for doctors, nurses, midwives, dentists, and opticians, but never a reference to a pharmacist as a necessary unit. Surely those who had responded to the call of the State by complying with the requirements and acquiring the statutory certificate of skill and knowledge and experience requisite for the practice of pharmacy were reasonably entitled to ask the State to reserve to them the carrying out of the public service they had qualified themselves to render. At present, as Mr. Thomas Guthrie remarked at the conference banquet on Tuesday, we find one drug-selling shop to every forty inhabited houses, and

[12] *Lancet*, August 20th, 1938, p. 423.

medicines are sold in the market places and public houses and hawked from door to door. It seems, he said, that we have educated the pharmacist but neglected to educate the public.

ANY DOCTOR'S SERVICE IN EMERGENCY

THE fear of being unequipped for national service in a crisis has led to inquiries from medical men and women whose work has always been remote from clinical practice about possible arrangements for specialised instruction. The embarrassing confidence of the public in the theory of once a doctor always a doctor may seem absurd in peace-time; but if catastrophe should overtake us a basic training in medicine, however distant, should actually enable its possessor to revive his power to give practical service and to develop whatever technical skill he may have acquired as a student. The layman is likely to turn to any qualified person for guidance in an emergency so grave and prolonged as to make the familiar "first-aid" treatment designed as a temporary measure quite inadequate to the need. It might be impossible to clear patients quickly from an improvised casualty station, and such a station might have to be established at the actual site of damage at short notice with insufficient skilled medical or nursing staff to cope with the injured. There are many techniques that a doctor who has never practised must needs learn, or learn afresh, lest he should find himself incapable of giving help when it is most needed. Possibly the British Postgraduate Medical School might organise model courses to meet the requirements of those who have not recently or perhaps ever since graduation worked with their hands on sick people. The pattern of such courses would not be easy to design, but such inquiries as we have had in this office suggest that the principles and practice of treating compound fractures, severe wounds and burns, the scope and methods of applying the newer non-inhalation forms of anæsthesia and analgesia, and the technique of blood transfusion are among the subjects on which teaching would be sought.

STATISTICS FROM THE U.S.A.

ACCORDING to a report of the Bureau of the Census,[1] the estimated population of the Continental United States in 1936 was 128,429,000, or rather more than three times the population of England and Wales in the same year, which was 40,839,000.[2] The total deaths recorded in the two countries were in nearly the same ratio—namely, 1,479,228 in the U.S.A. and 495,764 in England and Wales, giving crude death-rates of 11·5 and 12·1. These enormous totals are, as usual, analysed in great detail in the two reports and comparison merely of the absolute figures reveals some interesting contrasts. For instance, enteric fever is a public health problem of more moment in the U.S.A. than in England and Wales, the deaths numbering 3182 to 357 or roughly 9 to 1. Deaths attributed to dysentery show a still wider discrepancy (3122 to 87). Other causes of substantially greater importance in the U.S.A., with its much wider range of environmental conditions, are acute poliomyelitis (780 to 102), tetanus (1088 to 116), malaria (3943 to 16), appendicitis (16,480 to 2869) and homicide (10,232 to 180). The last gives a ratio of over 50 to 1, a distressing state of affairs for the great majority of law-abiding American citizens. The relative incidence of suicide (18,294 to 5079) is, on the other hand, about equal in the two countries, but many other causes of death from violence are unduly high in the U.S.A. (drowning, burns, excessive cold and heat). Automobile accidents (primary) in the States account for the appalling total of 35,761 deaths or nearly 1 in every 40 deaths from all causes; 404 deaths occurred in air transportation accidents. Causes of death which did not figure at all in the English returns of 1936 were typhus fever (115 deaths in U.S.A.), rabies (73 in U.S.A.), small-pox (35 in U.S.A.), and beri-beri (11 in U.S.A.). Causes which appear to the disadvantage of England and Wales include pernicious anæmia, cancer of certain sites, rheumatic fever and measles, whooping-cough and diphtheria—though the ratio of these infectious diseases is naturally affected by their epidemicity. It may be noted that 35 deaths from childbirth took place in the U.S.A. at ages 10–14, 22 of which were in negroes. Superficially it appears that it is relatively easier to reach the century in the States for there were 1295 deaths at age 100 or over and only 96 in England and Wales. But the earlier introduction of birth registration in this country may produce greater accuracy at certification of death at advanced ages.

Another report recently issued by the Bureau of the Census[3] deals in detail with the place of usual residence and the place of registration of death in persons dying of cancer. This is a question of some moment in geographical comparisons in the U.S.A., for deaths are there normally tabulated to their place of occurrence, to the detriment, in this instance, of cities and the advantage of rural areas in regional comparisons. Similar tables for tuberculosis and maternal deaths are in preparation.

THE death of ARTHUR JOHN STORY removes one of the best friends deaf people ever had. It was largely owing to his consistent effort that deafness has come to be regarded as much in need of the care and sympathy of the public as is blindness. For more than twenty-five years Mr. Story was head master of the Blind and Deaf School at Stoke-on-Trent, lecturing and examining on speech and language for the National College of Teachers of the Deaf. For almost as long he was editor of the *Teacher of the Deaf*, and since he became secretary of the National Institute for the Deaf his office had been the clearing-house of a movement for the mitigation of acquired deafness and for the protection of the deaf from those who would exploit their disability for gain. Mr. Story, who was in his seventy-fourth year, died on Sunday last at a nursing-home in Southsea, where he was on holiday.

AMONG other bequests to medical objects, Sir David Wilkie has left £10,000 to Edinburgh University for the encouragement of surgical research. The money is to be invested and the income devoted to the maintenance of scholarships tenable for one or two years in the department of surgical research.

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[1] Department of Commerce, Bureau of the Census, Washington. Vital Statistics—Special Reports. Number of Deaths (exclusive of Stillbirths) from each Cause, by Sex, Race, and Age. United States. 1936. Vol. 5, No. 41, pp. 303–351.

[2] The Registrar-General's Statistical Review of England and Wales for the Year 1936. Tables. Part I. Medical.

[3] Department of Commerce, Bureau of the Census, Washington. Vital Statistics—Special Reports. Deaths from Cancer by Place of Residence. U.S. 1935. Vol. 5, No. 40, pp. 215–302.

POST-GRADUATE COURSE AT LEEDS.—A series of post-graduate lecture-demonstrations will be given by members of the staff at the Leeds Public Dispensary and Hospital on Wednesdays at 4 P.M., beginning on Oct. 19th. The course, which is free, is open to all members of the medical profession.

SPECIAL ARTICLES

DIAGNOSIS AND TREATMENT OF ACUTE POLIOMYELITIS

By M. Forrester-Brown, M.S., M.D. Lond.

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The diagnosis of poliomyelitis in the acute stage is not easy, for often the onset is vague, and even in patients who are acutely ill the symptoms may be almost identical with those of other febrile illnesses.

The disease has long gone under the name of "infantile paralysis" because in countries where it is endemic the majority of obvious cases are in quite young children, the rest of the population being immunised in early life by contact, or by an abortive attack, just as happens with measles and other specific fevers. If the severe forms of paralysis only followed a severe febrile illness, and mild cases were as free from late complications as are mild types of measles, then the urgency for early diagnosis and specialised treatment from the onset would be much less. It is because a patient, who has apparently recovered from a slight febrile or gastric attack, may suddenly lose the use of both legs, or an arm, after indulging in a little extra exertion, that it is so important to look out for the slightest signs of muscle weakness and to protect from strain any patient who shows suspicious signs. After all, a week wasted in bed, or even a few weeks of unnecessary splinting, is a cheap price to pay if it is to save numbers of other cases from permanent severe crippling.

Not only is the onset of poliomyelitis variable and often vague but the whole course of the disease differs so greatly—apart from the influence of treatment—that it provides a happy hunting-ground for quacks, who are able to claim all the credit for such spontaneous and often dramatic recovery as is common in the disease; while the most scientific and honest practitioner has great difficulty in estimating how much the steady improvement of a case owes to treatment. What becomes all too obvious, but often tragically late, is that some form of exertion, whether in the form of treatment or voluntary activity, has aggravated the muscle weakness, and this is sometimes followed by permanent paralysis of a muscle that was previously regaining power. To recognise the slightest signs of such deterioration it is essential to keep accurate charts of muscle power and to revise them systematically. The charts used in the Bath and Wessex Orthopædic Hospital are elaborations of those originally produced for the Harvard Research Council under the supervision of Lovett, and they have been found most convenient, though no chart is infallible. In these delicate tests the personal factor cannot be eliminated, and it is advisable to have the records repeated by the same observer each time. Needless to say, the quack never wastes his time on records of this sort, and unfortunately their value is overlooked by a large part of the medical profession also.

EARLY DIAGNOSIS AND SYMPTOMS

From what has been said it is clear that the diagnosis may be impossible at the actual moment of onset, but as with other diseases the more the possibility is borne in mind the earlier will a correct diagnosis be made. Therefore in any febrile illness in a child, before the diagnosis of "simple flu" is allowed to satisfy us, we should exclude the presence of paralysis, or slight muscle weakness. This is true whether the attack is one of mild pyrexia or swinging temperature; whether there is abdominal pain with diarrhœa or with obstinate constipation (a common paralytic phenomenon); even when pains in the limbs are associated with obvious fluid in a joint, such as the knee, ankle, or elbow. In recent epidemics, both in this country and in U.S.A., the attack of poliomyelitis has quite commonly begun with fluid in a joint, so that those patients who had high temperatures have been diagnosed as "rheumatic fever" and those with slight pyrexia as early tuberculosis of hip or knee.

Symptoms suggestive of poliomyelitis are *drowsiness* or severe *headache*, especially if associated with *head-retraction*. As pointed out some years ago by Dr. Jean Macnamara, the head-retraction is seldom so extreme as in meningitis, but in mild cases it can be noted when the child is asked to kiss its knee and is unable to do so owing to spasm of the spine muscles, which are often tender to touch. *Spasm* of other groups of muscles, such as the calf muscles, causing equinus, and the sartorius, causing external rotation of the hip with the foot falling on its outer side, are common and are seen apart from obvious arthritis. Such localised spasm is rare in other diseases.

Bladder symptoms, whether retention, incontinence, or mere irritability, are common in poliomyelitis, but do not distinguish it from the *Bacillus coli* infections so common in children. Nocturnal incontinence may persist for many months after an attack of acute poliomyelitis. *Cough*, varying in severity from that of a mild bronchitis to severe pneumonia, is very frequent in acute poliomyelitis, though it has never been determined whether the respiratory disease is caused by the same or a different organism from that involving the nervous tissue. There is nothing characteristic in the lung signs.

Muscle weakness is suggested if the child had fallen just before or just after the onset of the fever, especially if it had been unable to get up or to walk afterwards, although there was no sign of any fractured bone. The parents attribute the illness to the fall, but it seems likely in many cases that weakness of the quadriceps or glutei was the first sign of onset and caused the fall, rather than that some trivial fall predisposed to the disease. On the other hand, it occasionally seems that some severe injury has precipitated an attack. Overheating, either from exposure to the sun, or from excessive exercise, appears a definite predisposing cause, but very often there is nothing to account for the infection, not even contact with a known case or carrier. In fact, it is extremely rare for any of the contacts with a frank case to develop the disease after the usual incubation period; if they do so before that one may suppose that both cases contracted it from the same unknown source.

SIGNS

Accurate muscle tests to determine the exact strength of various muscles are very difficult at any time and especially in a sick, irritable child, but usually it is relatively easy to exclude paralysis or note considerable degrees of weakness. *Tremor* is a common early sign of muscle weakness in acute poliomyelitis and is most often found in the hands, but may be seen in any muscle group after an effort has been made to resist manipulation. It is not

common in other acute illnesses of children. General *lack of muscle tone* is very characteristic, and though found after any illness with loss of fluid, such as infantile diarrhœa, it is not usual in the acute phase of other febrile illnesses. The muscles feel like jelly, and as the limb lies on the bed it flattens out, especially the calves. Muscles which are in spasm naturally feel firmer. The flaccid limb muscles may be tender to the touch and by careful palpation one can determine that the pain complained of when the child is bathed or picked up is localised in the muscles themselves. This is also true of the abdominal pain, which is associated with distension, due to atony of the bowel and abdominal wall. It is apt to be mistaken for appendicitis but is not associated with spasm in the right iliac muscles.

Although, as already remarked, the accurate estimation of muscle-power is difficult, yet in a young child unwilling to coöperate, one has only to pull the limb joints in different directions to stimulate resistance. If a struggling child never uses one limb at all, or fails to move one joint in a certain direction, it is evidence that he cannot. If one lifts a part against gravity and lets go suddenly the normal muscle will contract to break the fall; if the part drops dead it is because the muscles are too weak to respond to reflex stretching. It only takes a moment to test all four limbs in this way.

If whenever the foot is dorsiflexed the great toe takes up a claw attitude, one may be sure the tibialis anticus is weaker than normal and is being helped out by the extensor hallucis. If the thenar eminence is flatter on one side, one should try whether the thumb can be opposed actively to the little finger; if it tends to crawl across the palm, then the thenar muscles are weak and their work is being done by the long flexor and possibly part of the flexor brevis also. If the thumb cannot be brought across the closed fist to the ring finger, then there is weakness of the abductor brevis pollicis. Weakness of this muscle group is often overlooked but may result in serious interference with function later, especially in the right hand.

Weakness of the *abdominal muscles* is common but very easily overlooked if not specially tested for. The following tests should be used as a routine:—

1. Lying on his back the patient should be asked to lift both legs at once with the knees straight. Difficulty in beginning may be due to psoas or abdominal weakness or both. Psoas weakness can be excluded by flexion of one hip against resistance. If the umbilicus does not move during the lifting, but the abdomen bulges, or the lumbar spine rises from the table (by unopposed psoas action), then the weakness is uniform. If the umbilicus descends, the upper half of the *rectus* is weak; if it rises the lower half; if the umbilicus moves sideways, one set of *lateral abdominal* muscles is weaker than the other. Greater differentiation than this is neither possible nor necessary. If only one leg is lifted, the trunk muscles may be strong enough to control the weight, or those on opposite side may bulge.

2. Still supine, the patient should be asked to raise his head without use of the arms. If the recti are weak, this will be difficult, or again may cause the umbilicus to move. If the recti are very strong, this manœuvre may elicit weakness in the lateral muscles, especially in the region of the inguinal canals.

3. With the patient prone, he should be asked to raise himself backward with arms in the air ("fly like a bird"); this throws a great strain on the *lateral abdominal* muscles and they bulge, either one or both sides, especially if the position is maintained long. Occasionally a hernia appears in the region of the quadratus lumborum. In this position also the tone of the glutei can be noted and any serious wasting is obvious. Even partly paralysed glutei may be strong enough to lift the thigh backward off the table, but may be totally inadequate to balance the whole trunk and upper limbs while the patient stands.

The scapular muscles are often overlooked, but weakness in them may cause serious impairment of the upper limb for heavy work. Two tests are valuable:—

1. To resist the patient's attempt to draw his arm to his side; if the *rhomboids* are weak the adductors will then pull the scapula off the trunk towards the arm.

2. To resist the patient in a pushing movement with arms forward at right angles. If the *serratus magnus* is weak, the scapula will wing backward off the body.

If the patient is not too ill to stand, his attitude should be noted and he should be asked to stand on each leg in turn. Any tilting to the side of the supporting leg is suggestive of weakness of the hip abductors, while tilting backward results from weakness of the gluteus maximus.

Sagging of the abdomen is all too common in the general population but, if the patient is unable to *retract the abdomen* when standing, he should be carefully tested recumbent. Similarly, *winging of the scapulæ* when standing may only be due to postural dropping of the ribs, so that the scapulæ have no support. If it disappears on pushing, it is not paralytic. The patient should be asked to bend forward with the head on the knees, preferably seated, so that any leg weakness has no effect; then, if the *ribs* on one side, or the lumbar transverse processes project more than on the other, we know that organic rotation of the vertebræ has already taken place, and the patient will need much rest and careful watching, as the risk of serious spine deformity is great.

Wasting and slight degrees of *shortening* of the lower and upper limbs, if associated with some of the signs already referred to, are suggestive of poliomyelitis of some standing, especially if the wasting is not unilateral—e.g., one thigh, opposite calf, and forearm. In the earliest stages wasting of paralysed muscles has not had time to develop; moreover, both limbs may be involved at the start and only later does one gain strength and volume faster than the other. Similarly, shortening of one limb is a late phenomenon.

Trophic changes, such as blueness and coldness of a limb, may be seen quite early, and paralysed limbs very readily develop pressure sores, even when careful treatment is given to the skin at short intervals. The mother may notice coldness of a limb without observing weakness in it.

LUMBAR PUNCTURE

Lumbar puncture as an aid to diagnosis has not in our experience often been necessary, though as a form of treatment to relieve severe meningeal symptoms it is most valuable and can be repeated whenever the irritability returns and is not controlled by ordinary sedatives like bromides. Meningismus in other infections is usually associated with a normal cerebro-spinal fluid, while other forms of meningitis show much greater changes in the fluid, though there is no absolute diagnostic change. Usually in poliomyelitis the tension is moderately increased, there is a slight increase in globulin and a variable increase in the cells, which are polymorphs for the first few days and later lymphocytes.

Treatment

The treatment of poliomyelitis in the acute stage is still a controversial subject, and has recently led to discussions in the lay press. Owing to the erratic course of the disease when untreated, it is difficult to apply mathematical tests to the results of any form of treatment, so that I am only putting forward views based on personal experience, which has confirmed the value of the principles laid down by pioneers like Lovett and Robert Jones.

The Scottish motto of "ca' canny" seems particularly applicable to these cases, for if Nature intends to provide a spontaneous cure a little extra rest can have done no harm, while, conversely, if one miscalculates the dose of exercise one may cause overfatigue and harm that is irreparable. The ideal middle course is no easier to find in this field than in any other in life.

At the onset it is desirable to rest the trunk and limbs against the stresses of gravity and in attitudes which balance the extensor groups of muscles against the naturally more powerful flexors—i.e., the spine should be straight with a little pillow to keep up the normal lordosis; the hips and knees extended; the feet at right angles with arches supported. This is the neutral position from which walking can most easily be begun. If the deltoid is affected the shoulder should be abducted to about a right angle, care being taken to keep the elbow forward, so that the head of the humerus is not subluxated through the weak anterior capsule. The external rotators are generally paralysed also, but it is usually best not to put the limb into extreme external rotation for the same reason. The elbow must be supported either straight or bent, according to which group is most affected, the same applying to the wrist and rotation of the forearm, remembering that palmar flexion and pronation are favoured by gravity. The fingers and thumb should never be fixed in complete extension but in the attitude of grapsing a large ball, so that if any stiffness of joints develops from trophic disturbance, then the hand still has some function and can be mobilised evenly in both directions. In my opinion these aims can be most simply and efficiently attained by nursing the patient on a Jones's double hip-frame with just so much bandaging, traction, and other attachments as are necessary to balance spasm of any particular muscle group.

Spasm of the *tendo achillis* is most safely controlled by a plaster splint below the knee, applied over light padding, which protects the limb from sudden temperature changes. This applies also to spasm of either invertor or evertor muscles. Spasm of the *sartorius* is an indication for reducing the abduction to the minimum compatible with nursing and sometimes the outward rotation of the femur needs rotary traction by adhesive strapping passed inwards round the knee and attached to a weight hung over the side of the bed. Care must be taken to keep the tibia and femur in the *same axis*, and therefore the foot must not be rotated in, if the femur remains rotated out, for such spiral displacements of the tibia on the femur can never be undone and are a great source of poor function in neglected cases, in whom they may be compensated by a circular osteotomy of the tibia.

Flexion deformities of the knee and hip are best treated by skin-traction with a pad under the head of the tibia to prevent levering it backward, another non-reversible deformity. When all muscles below the knee work well, I use a spring foot-piece, which allows plantar flexion against resistance and brings the foot back to a right angle.

When the upper limb is paralysed it has been found sufficient to put a wooden cross-bar under the saddle of the frame and place a pillow on it for support of the limb, while a strap round the wrist can be used to sling the limb to the head of the bed (abduction with elbow extension) or to a Balkan beam (elbow flexion or extension). If the Balkan beam is used the limb can be so counterpoised with weights that exercise of all the muscles is possible without strain, so long as the patient remains recumbent. This is the method which has been in routine use at the Bath and Wessex Hospital for over ten years, and we have seen no reason to change the recommendation we gave of it at the Dublin meeting of the British Medical Association in 1933. With this system deformities have been prevented, except for moderate degrees of rotation of the spine which seem unavoidable, whatever method is used, though early and good compensation makes them of minor importance. The Jones's frame has the advantage over plaster-of-Paris that it allows easier attention to the skin of the trunk and limbs, while it allows small range movements in the joints.

MUSCLE RE-EDUCATION

Everyone is agreed that training of weak muscles under an expert hastens the return of good function, but there is divergence of opinion as to when such training can be safely begun. While a child is irritable and its limbs painful when handled, any measure which sends exciting impulses into its central nervous system runs the risk of being harmful. Naturally, the more skilled and tactful the masseuse, the earlier can she be entrusted with the case, but as the disease is widespread, while tact and skill are less so, a policy of caution has advantages.

One cannot lay down a hard rule that one must wait for the temperature to become normal, for in some cases it remains irregular for several months, though no other signs of irritability remain. Muscle tenderness is a danger sign, but some believe that part of the pain is vascular in origin and can be dispersed by gentle stroking to improve the circulation. Probably no two cases are alike in this respect. It has been our policy to give doubtful cases two months before beginning massage; in some, even after this period, active treatment has had to be stopped for a few weeks because pain came back and strength was being lost instead of gained and the temperature rose dangerously. After a further respite, when treatment is restarted, progress has usually been steady.

Re-education in a warm, deep pool is of great value, especially in restoring the walking balance for nervous cases with much trunk and hip weakness. The water counterbalances the trunk so that very little muscle power is needed. Tall children and adults may need the knees stiffened by vulcanite back-splints and even lead weights to the feet to keep them from floating up. If children are nervous of the water it may do more harm than good.

It is difficult to decide when it is safe to allow walking, but it is usually wise to keep the patients prone for increasing periods each day until they have good active hyperextension of the spine. Then they should be tested on their feet. If the abdomen sags badly a corset should be worn until abdominal tone in the upright position is good. Nothing is more striking even after complete paralysis than the improvement in tone of the abdomen in cases so treated, compared with mild cases allowed up for long periods without a corset.

A postural scoliosis at this stage can often be cured by training the patient in a calliper, which gives him confidence on a weak leg and checks a tilt to the

weak side, for the scoliosis is as often started by gluteal as by trunk weakness. The idea that a calliper will discourage activity and not improve strength is quite disproved by our experience, for in it a patient with moderate weakness can indulge in all the activity that is safe for him, including football; if it discourages excessive exercise that is an advantage not a drawback! It certainly checks the insidious outward torsion of the tibia on the femur, which results from assistance to a weak quadriceps by the sartorius; it also prevents knocking from weakness of the vostus internus, a deformity which may tip the scales against a tibialis anticus or posticus being able to maintain the arch of the foot. The chain of these insidious and complex secondary deformities cannot be undone in the same or reverse order in which they develop; they mostly require elaborate operations for their compensation and they exclude normal function.

ASPHYXIA

The use of the so-called "Iron-Lung" has been left till the end, although it is generally needed at an early stage of the illness, because it is not applicable in general practice; the most skilful nursing is needed and it really requires a nurse already trained in its use. The prevention of sores and the prevention of deformities are both difficult with this apparatus. There is only time here to give a word of warning as to its effect on prognosis.

The indication for mechanical artificial respiration is essentially *paralysis of the respiratory muscles* and it can only save life permanently if such paralysis is transient, as it sometimes is. If the paralysis is of the intercostals and accessory muscles of respiration, the machine should be used early and its use is likely to result in better recovery than if the paralysed muscles are allowed to remain stretched and inert, while the general ventilation of the blood is reduced by inadequate chest expansion. For the same reason it is better to continue with the machine after some recovery of the muscles has taken place; otherwise they, like those of the limbs, may soon become fatigued by excess work and a secondary, permanent paralysis result. If the paralysis involves the diaphragm as well as the other chest muscles, then the machine is essential and it is likely to be needed for a long period.

Blockage of the air-passages is not relieved by the apparatus, which is useless until free air-entry is secured. Blockage is suggested if more than 20 cm. of water, negative pressure, is insufficient to prevent cyanosis and respiratory distress; for a greater pressure than this should not be used; usually 14 cm. is enough.

Pharyngeal paralysis is likely to result in the aspiration of food or mucus into the lungs and should be dealt with by rectal feeding and keeping the patient tilted with the foot of the bed greatly raised, so that saliva can drain out by gravity. If necessary, continuous suction may be used, but it is likely to irritate and excite the patient. Occasionally, tracheotomy is necessary, especially if the patient's sleep is continually disturbed by choking attacks, from aspiration of secretions into the bronchi as soon as he falls asleep.

Paralysis of the *respiratory centre* is usually associated with other forms of bulbar paralysis in cases so severe that a fatal issue is inevitable. The respirations are shallow and either rapid or slow and smoothly irregular (not typical Cheyne-Stokes breathing) and this rhythm interferes with that of the box, in which it is desirable as far as possible to synchronise the movements with the patient's own rhythm, the rate being 15–20 per minute in adults, and 20–30 in children. The higher rates are required where there is a complication like severe bronchitis, or pneumonia.

In one of my cases respiratory paralysis of sudden onset passed off most dramatically after cisternal puncture, but neither this nor repeated lumbar puncture can be guaranteed to cure such a severe condition.

SERUM.—ELECTRICITY

Two other methods remain to be mentioned only to be condemned.

Serum promised great things a few years ago before the mode of entry of the virus was understood and before it was realised that in any epidemic a large proportion of cases are abortive, apart from any form of treatment. Now, however, it is considered valueless by the best authorities, for in animal experiments an active serum will only protect from infection if it is used to neutralise the virus before they are both injected together; if the virus is injected first, then the immune serum seems unable to overtake it. The latest experimental work suggests that although a patient's serum carries immunising bodies after an attack of poliomyelitis yet the real resistance to infection, in those who escape, resides in the central nervous tissue itself, and so far no method of improving such resistance is known.

Electricity has had a great vogue and is still allowed in some centres to play a part in the treatment of the early stages of poliomyelitis. As already indicated it is likely to get the credit of spontaneous recovery, while the degree to which it fatigues damaged cells is not measurable. I regard it as a dangerous weapon, because it passes Nature's guard—the inhibition of impulses through damaged cells at the beginning of fatigue—and allows those cells to respond much longer to an electric stimulus.

SUMMARY

To sum up, the treatment of the acute stages of poliomyelitis cannot err in the prescription of too much rest for body and mind; for paralysed muscles and for muscles apparently not paralysed; for joints whose every stir sends an afferent impulse into the central nervous system; and for irritable emotions, whose expression disturbs all these tissues from their repose.

Of the early features of poliomyelitis spasm and weakness of muscles call for most attention and requires simple but accurate tests to elicit slight departures from normal.

In the treatment of the disease, rest—bodily and mental—is essential. Muscle splinting is best carried out on a Jones's double frame. Re-education of muscles hastens recovery of function but care is necessary in choosing when to begin.

HALL OF NATIONS AT CARDIFF.—The Hall of Nations stands in Cathays Park, the civic centre of Cardiff, on a site presented by Cardiff county council, and it has been built by Lord Davies at his own expense at a cost of £62,000. It is now nearly complete, and in November it will be dedicated to the cause of international peace and justice. It will serve a practical as well as a symbolic purpose, for it is to provide office room for the headquarters of the King Edward VII Welsh National Memorial Association, which is the Welsh national organisation for the prevention and treatment of tuberculosis, and also for the Welsh National Council of the League of Nations Union.

AUSTRALIAN NATIONAL INSURANCE

COMPARISON WITH BRITISH SYSTEM

THE question of introducing compulsory health insurance into Australia has long engaged the attention of Australian statesmen. A few years after the war the Commonwealth Government appointed a Royal Commission to consider the question, and the Commission reporting in 1925 recommended that a system of compulsory insurance providing sickness, invalidity, maternity, and superannuation benefits should be instituted. Political conditions at that time were unfavourable to the adoption of this recommendation, but the question was not lost sight of, and was taken up for serious consideration by the present Government soon after they came into power. The fund of experience accumulated in the administration of the British insurance system was naturally drawn upon, and in 1936, at the request of the Australian Government, the Ministry of Health made the services of Sir Walter Kinnear available to the Government. Sir Walter's report, outlined by our Australian correspondent in our issue of June 25th, forms the basis of the Australian scheme. Last January he again visited Australia, accompanied by two colleagues, to assist in the inception of the scheme, which became law in July and comes into operation on Jan. 1st, 1939.

RECIPROCITY.—BENEFITS PROVIDED

An important feature of the scheme is that it provides reciprocity with the other Dominions and with Great Britain. Contributions for social insurance paid in one country will count in making insurance benefits available in other countries of the Empire. The British scheme has a similar provision, but it has hitherto been inoperative, since no similar scheme had been established in the Dominions. It is thought that this development should encourage migration from Great Britain to Australia, where British immigrants are so much desired, in counteracting the reluctance felt by men and women in this country to sacrifice by emigration the rights to health insurance and pensions benefits for which they had paid their contributions. It may not be generally realised that since the onset of the economic depression some eight years ago the ordinary flow of migration between Great Britain and Australia has been reversed; the emigrants of British stock from Australia to this country have been more numerous than the immigrants, and the presence of social insurance here and its absence in Australia is held to be one of the causes of this disquieting phenomenon.

The Australian scheme provides health insurance benefits, and old age, widows', and orphans' pensions. Unemployment insurance is not provided, but is reserved for further consideration. The scheme is on a compulsory and contributory basis and applies to all persons aged 16 and upwards employed under a contract of service in manual labour irrespective of income, or in non-manual labour at a rate of remuneration not exceeding £365 a year. Juveniles employed between 14 and 16 years are insured for medical benefit only; and though provision is made for voluntary insurance a voluntary contributor whose total income from all sources exceeds £365 a year is not entitled to medical benefit. It is estimated that the number of insured persons will at first be about 1,850,000 out of a total population of 6,750,000. Employers and employed contribute equal weekly sums, and a substantial contribution is made by the Exchequer. The insured person's contribution is 1*s*. 6*d*. for men, 1*s*. for women, and 4*d*. for juveniles. Sickness benefit is at the rate of 20*s*. a week for men and 15*s*. for women, corresponding rates for disablement benefit being 15*s*. and 12*s*. 6*d*. At age 60 an insured woman becomes entitled to an old age pension of 15*s*. a week; for men the old age pension begins at age 65 and is 20*s*. a week. Widows receive a pension of 15*s*. a week, with an allowance of 3*s*. 6*d*. for each dependent child, and the orphans' pension is at the rate of 7*s*. 6*d*. a week up to age 15. Old age pensioners receive medical but no sickness or disablement benefit.

ADMINISTRATION

The central administrative authority is the National Insurance Commission, which consists of three members appointed by the Governor-General. The chairman is Mr. J. B. Brigden, formerly professor of economics in the University of Tasmania. Approved societies enrol the insured persons and administer sickness and disablement benefits, and it is a condition of approval that a society must have a minimum membership of 2000. Provision is made for the granting of additional benefits by societies having a sufficient surplus for the purpose, and one important point in which the scheme differs from the British model is that a society cannot retain the whole of its surplus; half is put into a common fund from which assistance may be afforded to societies carrying exceptionally heavy risks. The societies are not concerned with medical benefit, which is in the hands of the Commission. Medical benefit, as defined in the National Health and Pensions Insurance Act,

"consists of such proper and necessary medical services as are prescribed and the provision of proper and sufficient drugs and medicines and of the prescribed medical and surgical appliances and the supply of such medical certificates as are required for the purposes of the Act, but does not include medical services involving the exercise of such special skill or experience as general medical practitioners cannot reasonably be expected to possess or treatment or attendance in respect of a confinement or such other medical services as are prescribed."

It devolves upon the Commission to enter into contracts with medical practitioners for the supply of medical services to insured persons and to prepare lists of such practitioners. Any practitioner may participate and have his name placed on the list of his area, and the insured persons have free choice of practitioner from among those on the list. Similar arrangements apply to chemists.

The Commission will be advised by a medical benefit council consisting of persons representing insurance doctors, insurance chemists, employers, and insured persons, and members nominated by the Minister of Health. One of the functions of this body is to decide whether any substance is, for the purposes of the Act, a proper and sufficient drug or medicine. The Commission may divide the Commonwealth into districts and establish in each a district medical benefit committee to deal with complaints and to exercise such other functions as may be prescribed. Provision is made for the establishment of a medical practitioners' committee and a pharmaceutical chemists' committee to assist in the administration of the scheme.

DISPUTED QUESTIONS OF MEDICAL SERVICE

It will be seen that the scheme follows the British model closely not only in its main features but in points of detail. This is specially notable in the

arrangements for the provision of medical services. Medical benefit and the cash benefits are under separate administration. The range of medical treatment is limited to general practitioner services and excludes attendance in respect of a confinement. Medical services are given by private practitioners under contract with the insurance authority; any practitioner has the right to participate and the insured person has free choice of practitioner; and it is contemplated that the practitioners will play an important part in the administration of the scheme. These generally are basic conditions to which the medical profession in all countries attaches high importance, and no difficulty in regard to them has arisen in Australia. Unfortunately, however, serious differences have developed between the Government and the doctors on medical remuneration. The Government offer a capitation fee of 11*s.* with mileage at the rate of 2*s.* per mile one way beyond three miles with an increased rate in specially difficult areas. The profession contends that the capitation fee should be 14*s.*, to be increased by 25 per cent. "for country areas," that mileage should be 2*s.* 6*d.* per mile beyond two miles, 6*d.* to be payable by the patient, and that there should be an extra fee of 2*s.* 6*d.*, payable by the patient, for calls between 8 P.M. and 8 A.M. The proposal that the patient should pay part of the cost of mileage and night calls arises doubtless from the apprehension that unnecessary calls may be frequent, at all events in the early days of the scheme's working, but it would be unpopular and will probably receive little support from the public. The Government has appointed a Royal Commission to consider the disputed questions of medical service. The chairman is Chief Justice Dethridge (chief judge of the Commonwealth Arbitration Court), who has as colleagues Sir George Mason Allan (president of the Institute of Chartered Accountants, Sydney) and Dr. R. D. Mulvey (president of the Western Medical Association, New South Wales). The findings of the Commission will not be binding on either party, but it is hoped that by a searching inquiry and a free interchange of views conclusions acceptable to both will be reached.

PANEL AND CONTRACT PRACTICE

The Dangers of Delay in Visiting

A MAN who first went to see his insurance doctor on March 16th complaining of abdominal pain, like severe indigestion, and flatulence, died on March 22nd, the day after he had been admitted to hospital and operated on. His doctor had given him pulv. bism. co. for gastritis on March 16th, and next morning when he went to the surgery again feeling too ill to go to work he was told to continue the powder and was given a certificate of incapacity on account of acute gastritis. He told his mother that he had not been examined but the doctor said that he had ascertained that there was no tenderness on palpation though he had not placed the patient on the couch. Four calls were paid to the surgery by the man's father or mother to report more severe symptoms, including vomiting, soreness of the abdomen and flatulence between March 17th and 21st. The doctor changed the medicine to mist. kaolin sed. and prescribed albumin water but did not visit the patient until the early afternoon of March 21st when he arranged for his admission to hospital, where a perforated appendix was diagnosed and an operation performed. The practitioner told the medical service subcommittee that at no time until his visit on March 21st had he regarded the case as serious or requiring another visit, and that on March 21st, though the patient complained of feeling sick, temperature and pulse were normal, and the bowels were acting. The patient did not seem very ill but he advised removal to hospital because there was general rigidity of the abdomen. The medical service subcommittee expressed the view that the doctor should have visited the case much earlier, having regard to the condition of the patient as conveyed to him, and that by failing to visit he committed a breach of the Terms of Service. They recommended that he be severely censured. The insurance committee decided to recommend the Minister of Health to withhold the sum of £100 from money payable to the committee with a view to the deduction of a corresponding amount from the remuneration payable to the practitioner. It is difficult to understand why, if the subcommittee who saw the witnesses were content to recommend severe censure, the full committee on exactly the same facts should have gone so far as to ask for the withholding of such a large sum of money. But whatever the criticism of the case for this particular practitioner it illustrates once again the danger of neglecting to visit patients whose progress is reported to be unsatisfactory.

What is Emergency Treatment?

Regulation 15 (1) (*g*) lays it down that the Allocation Scheme, prepared jointly by the Insurance Committee and the Panel Committee, shall provide for the provision of treatment by an insurance practitioner where neither the insurance practitioner responsible for providing treatment nor his deputy is available for giving treatment immediately necessary owing to an accident or other sudden emergency. There is no definition of "sudden emergency," but its meaning would seem to be sufficiently clear from the wording of the regulation, which refers to treatment being "immediately necessary." The existence of the need for immediate treatment must be judged by reference to the circumstances of each case; urgency of the kind usually associated with accidents appears to be implied by the words "accident or other sudden emergency."

An insured person was cycling to work and the front wheel of his cycle caught in the tramline; he fell on his face. He was treated for a cut over the eye by the deputy of an insurance practitioner whose surgery was close to the scene of the accident, and an account was rendered by the practitioner. To a communication from the insurance committee he replied that he had ascertained that the insured person did not say that he was insured. The doctor suggested as a reason for this reticence that the man may have known that as an insured person he was entitled to receive only emergency treatment, which in this case would have consisted of a dressing, and would have had the extra trouble of going to his own doctor for a stitch. The victim, however, maintained that he had told the doctor's deputy that he was insured and that he visited his own doctor on the following morning. The insurance committee wrote to the practitioner that they were satisfied that the man was entitled to treatment from him, or his deputy, and that the account should be withdrawn. They explained also that under the Terms of Service a practitioner is required to render in a case of emergency whatever services are, having regard to the circumstances, in the best interests of the

patient. It seems that some practitioners still think that only first aid is required of them in these circumstances.

Another Trap for the Unwary

A number of practitioners in the North of England have had to appear lately before the medical service subcommittee for an unusual breach of the certification rules. One doctor issued a first certificate on Jan. 14th, giving the cause of incapacity as influenza. He then issued intermediate certificates on the 19th and 26th, and on the 28th he issued an intermediate convalescent certificate recommending a fortnight's convalescence. The medical certification rules state that if a practitioner considers that an insured person who has been continuously incapable of work during the preceding 28 days will not be fit to resume work until after a period of absence from home, he may issue an intermediate convalescent certificate to cover a period of not more than 14 days. In this case the insured person went to a convalescent home on Jan. 29th and stayed there until Feb. 12th. The doctor explained to the committee that his son, who was deputising for him while he was ill, issued the convalescent certificate, not appreciating that this should not be done until the insured person had been incapacitated for 28 days. In a second case the same practitioner issued a convalescent certificate only three days after the initial certificate. He was censured for the first case and in the second the Minister of Health was recommended to withhold the sum of £1. In a third case an assistant new to insurance practice issued a convalescent certificate to a man who had not been certified as incapacitated at all and was, in fact, at work. The assistant said that she had acted on the assumption that a fortnight's change would benefit the man's bronchitis, as indeed it did. The practitioner had to take the responsibility for his assistant's action and the Minister was again recommended to withhold £1. Insurance practitioners should remember that if a patient requires convalescent treatment before he has been incapacitated for 28 days he should obtain certificates while he is away from a local practitioner, who should be asked to accept him as a temporary resident. Another point is that an insured person in receipt of sickness benefit should obtain the concurrence of his approved society before leaving home.

GRAINS AND SCRUPLES

Under this heading appear week by week the unfettered thoughts of doctors in various occupations. Each contributor is responsible for the section for a month; his name can be seen later in the half-yearly index

BY "HAKIM"

III

"And looking back," wrote Joseph Conrad, "we see Romance, that subtle mirage that is life. It is the goodness of the years we have lived, of the old times when we did this and that, dwelt here and there." For one who, like myself, has knocked about, done this and that, dwelt here and there, the mirage holds many pictures—my brightest were painted in the lands of mirage, in the colours of the East. And the years there were good—or seem so now, for that is Romance. The incidents of one's medical work that one remembers make no more romantic history than those which have happened to a doctor practising, let us say, in Wigan—the mirage is personal.

* * *

Listening recently to a variant of the perennial complaint about the scandal of our out-patient system—it is easier to complain of than to rectify—I was reminded of a batch of out-patients I once saw. The scene was very different from that presented daily in the out-patient department of a big London hospital.

There were no nurses, and only one doctor. The patients, all of one sex, were seen in a bunch, no one of them having to wait 3 hours for his turn. And as none of them were ill, there was no chance of some serious condition being overlooked till the last, no chance of an applicant being examined casually, or perhaps sent away because there wasn't time to look at him. (Not that most of us believe the wilder accusations made against a harassed and overworked hospital staff.) My patients had none of the amenities of a London hospital. There was no waiting-hall, there were no benches—they sat on the hard ground; but also there was no ticket for entry and there were no formalities. The only resemblance of my clinic to one in this country was the buzz of conversation. The scene was outside the gates of a fort—the country, Waziristan, near the border of Afghanistan. The attendance numbered about a dozen Pathans, all of them Mahsuds, as one section of the inhabitants of Waziristan call themselves, and to be more particular, if I remember rightly, all members of a tribe known as the Abdur Rahman Khel. They had come to see the Political Officer on some matter connected with a blood-feud, and hearing that I was in the fort, asked to see the doctor. They all had the same request—they wanted an iron tonic! Indirectly, this was a prayer for rejuvenation—being notables, and one of them a Sheikh, they made a deputation of high average age. They had great faith, they said, in iron; it was the stuff to give a man a "strong back."

I did my best, and dispensed the medicine for them before their own eyes. Ingredients to hand were a strip of iron from the barbed wire entanglements round the fort—they saw me cut it—strong hydrochloric acid, tinct. asafœtidæ, a carminative from the garrison dispensary, and soda-water from the officers' mess. This horrid mixture, calculated, I hoped, to "repeat" into the mouth, was compounded in an empty Winchester quart bottle—the iron being first dissolved before them in the hydrochloric acid, so that they could see that there was no deception. They took it, sitting in a wide circle on the ground: the bottle passed from hand to hand. They drew wry faces—and it *did* "repeat," but it was unanimously declared a really strong medicine. Indeed, so pleased were they that the Political Officer said afterwards to me that my quackery—as he was pleased to call it—was worth as much politically as some of his diplomacy. He was surprised that I had been consulted, till I told him that during the months I had been in the fort—incidentally learning the Pushtu tongue—I had worked up quite a respectable out-patient practice, of which my strong-back suppliants had probably heard.

The nucleus of this practice began with a tribesman who, in the course of a blood-feud, had been injured in an eye. The eye was irreparably damaged, so I took it out—and promised him a new one. I wrote to Bombay for samples, and the firm I chose, misunderstanding my letter, sent me a selection of artificial eyes ranging from black buck to tiger, but none of them human. They evidently thought that big-game shooting was the only occupation in that part of the world. I was annoyed about this; but my patient was childishly pleased, and insisted on making his choice. I think he picked on some kind of deer's eye—whatever he chose, it certainly wasn't a match for his sound eye. Perhaps he wanted a mild and melting eye to bluff with! Of course it was too big to fit his socket, but he went away happy. Later I got him an eye to fit—but it didn't match either. The bottom fell out of my out-patient practice when I killed one of my important patients. He, too, was a Sheikh, and his compound fracture of a femur from a gunshot wound had also been the result of a blood-feud. He died on my makeshift operating table, and it was touch and go that I didn't have a blood-feud fastened on myself.

* * *

Nowadays motor-buses ply from village to village in India; this must have greatly changed the habits of the people. On these side-roads, then mere dusty tracks, civil surgeons of my time would ride up to fifty miles in a day—relayed by a second pony—to inspect an outlying dispensary, or more rarely to attend a patient. It would be a wealthy Indian that called the only European doctor in the district to go such a distance. One used to combine the dispensary visits with inspection of the work of the public vaccinator. The danger of small-pox in Eastern countries is real; to make protection doubly sure six-point vaccination was the rule—three points on either arm. The mothers would be lined up by the dusty roadside—they had been collected beforehand by the Indian inspector or sub-inspector—clad in a flutter of drapery, bright as the scarlet blossom of hibiscus by the village tank, or ragged and dusty as the fronds that drooped from the hot palm-trees. One was sorry for these mothers. A child with only one painful arm can be carried and soothed with the sound arm against the breast, but it is difficult to find a restful position for a fretful baby terribly sore in both arms. Not that the Government lymph was bad. I happen to have been in charge for a time of one of the depôts, and gained there my first experience of razorless shaving by taking the hair off a rabbit's back with a solution of sod. sulphide. We used to enhance the stock strain of vaccine virus from time to time by passing it through some animal other than a calf. There was always a sound of lowing in the compound of the depôt. But what with the varying susceptibilities of individuals to vaccinia, and the chances of sepsis in an Indian village, one occasionally saw arms that made one wonder that the mothers did not complain more bitterly.

* * *

The first motor-cars seen on those country roads caused a real sensation. And I owned one of them; in fact, I owned—at second-hand—No. 1. It had one cylinder, too, very loud-firing, no hood, no doors, and no wind-screen; and it rattled—it was nicknamed the sewing-machine. If it stopped near a village—it had many an involuntary stop—the inhabitants came out en masse and sat round it; children in the front row. They would watch for an hour—it took about that time—with intense curiosity, and without moving or offering to help, my wrestles in the heat to put on a new tyre. There is a Bengali doctor practising in a district near Calcutta—I sincerely hope that he is still practising—who has cause to remember No. 1. He summoned me in consultation one night, and I took him with me to the case in the car. The apology for a road was lit at intervals by a feeble glimmer, for the jolts were too much for the lamps. We were both bruised, but he came off worst; he couldn't walk in comfort for days afterwards. As a case, too, it was remarkable. The patient was a high-caste Hindu lady, belonging to one of those classes of Brahmins—I never properly understood Hinduism—who are entitled to wear the sacred thread; I think she was a Baidyo. I wonder that they called in a European—they wouldn't have if the case had not been urgent. My colleague had diagnosed obstruction from locked twins; so I took my most formidable instruments. The lady was certainly in a bad way; something had to be done, and at once. Having made my examination, I was completely baffled. "Twins, you think!" I said to my colleague "seems more like an octopus to me—I've counted seven feet already." And I had counted correctly. The monster—for a monster it was—was not very difficult to deliver. When we got it out, we found that it had two normal legs and a five-pointed mass like a star-fish continuous in the sacral region with the spinal cord of the fœtus. The rays of the star were legs, with feet on which the number of toes varied from one to eight. I got permission to take it away, and I put it in a bottle of spirit, meaning to present it to the pathology department in the University of Calcutta. But it went bad—the spirit was like post-war whisky, maybe a good deal under proof. A note on the case was published in the *Indian Medical Gazette* some time, I think, in 1910. The monster was stillborn, of course. Had it lived, it would surely have attained celebrity, if not divinity, as a reincarnation of the great God Krishna; for, if I remember rightly, Krishna is reported to have had a hundred arms—or am I thinking of Briareus? My colleague was jubilant over the successful result of the case. When above himself like that, he was weak on English idiom, and was well worth listening to. A few phrases I remember are "If I do not beat my own trumpet—then who?," "Sleeping fox catches no poultry," "It pinches me blue to think——"

One other memorable obstetric case came my way, out of the blue as it were. A friend and I were enjoying a day's snipe-shooting in the cold weather—how crisp were those cold weather days in Northern India, the air clear enough to allow a view of distant snowy ranges! Towards the end of the afternoon, when walking up a rice field, we were approached by a peasant. Was I not the "doctor sahib" he asked: then—pointing to a reed hut some way off—would I come and see his wife? She was very ill—three days, he told me, she had been in labour. The woman was indeed desperately ill; half-conscious, and in a high fever, and all but completely exhausted. The diagnosis was not difficult—an impacted cross-birth. Headquarters was far away; there was no swift transport to bring help, instruments, and drugs. We had come out shooting in a "ticca gharri" drawn by emaciated country ponies. The emergency was overcome by means of hot water, boiled in an empty kerosine oil tin, and a sickle, normally used for reaping rice. The water was used both for sterilising the sickle, and as a douche. With that instrument I cut through the body of the dead fœtus,

and delivered it in two halves. The woman, meantime, lay on a beaten mud floor.

My shooting companion was interested in the proceedings, and my dog sat through the whole performance with his ears cocked.

Leaving the patient in charge of relatives, we took the husband back with us to fetch medicines. Some weeks later the man told me that she had been ill for some days with a very strong fever, but "thanks to God and your Honour" she was now recovered. She must have had a marvellous constitution.

* * *

The last three patients I treated before the late war were at any rate cases unlikely to be met with in England. One was an elephant, another a man mauled by a tiger, and the third a horse. The elephant had a galled back, the result of a howdah rub. An abscess had formed under the gall. I was requested to lance it. The hide of an elephant's back is about 2 in. thick; the temper of an elephant is much thinner. I approached the operation nervously, armed with the largest amputation knife I possessed.

The mahout got the beast seated and held its trunk. No puny human force could have prevented the animal from lashing out if it wanted to, and one blow from its trunk would lay a man out; but it looked safe, somehow, to see the mahout holding it. Running in, I transfixed the swelling—luckily the knife was sharp—and cut upwards. Pints of matter poured out. I leapt back—the beast did not so much as flap an ear.

The condition of the young man mauled by a tiger was more serious. As he squatted peacefully on his hunkers by a river bank he had been spotted from behind a patch of jungle grass by a half-grown tiger cub. Tigers are accustomed to see humans walking, and as a rule will take no notice of a man erect; the cub's curiosity was aroused. It gambolled up like a kitten, gave a playful pat with one of its paws, and frisked away, leaving the man with his scalp hanging down his back. I stuck it on again—and have often wondered whether it stayed on.

The third patient was a valuable pony. A worm in the eye had begun to cause corneal opacity. What a job we had to throw him! It took three of us sitting on his head to keep him quiet. The operation is simple—incision of the anterior chamber to let out the fluid. As it gushes out, the worm comes with it—or should do. In this case it did. Years later—after the war—I learned that this patient had completely recovered, and won a race.

* * *

About my last view of Waziristan was from the air. It was many years later—after the war. It is a barren, inhospitable country, save for oases in the river beds, where the little villages cluster, surrounded by a rich greenery of terraced crops; and in the spring by the more delicate green of apricot trees in young leaf. The mountains, in outline bare, are brightly variegated, owing, I imagine, to the many different mineral salts which colour the rock. Their stark lines and crude colours soften to loveliness by morning and evening light.

But the country looks cruel from the air, like a pin-cushion of jagged peaks—all point upwards. It doesn't give one a good feeling, either, in the air—the heat is reflected so unevenly as to make flying extremely bumpy. I didn't feel too good myself that day. After a late night to bring in the New Year in proper Scottish fashion, my pilot had turned up in the dawn still wearing his mess-kit. I felt a bit doubtful about him—quite unnecessarily as it turned out. The wind in the front seat of a Bristol Fighter is strong enough to blow away headaches. Then as we rose higher and higher, there came into view the snowy masses of the Hindu Kush, and anxiety was forgotten. In just over an hour that day I made a journey that had taken me—nearly twenty years before—the best part of twenty-four hours, travelling by day and night in a "tonga." The ponies harnessed to that old-fashioned two-wheeled vehicle used to gallop most of the way; one picked up a fresh relay every ten miles or so. How the drivers used to yell at them!

* * *

Those days in India are gone, and with them the state of current medical knowledge which caused most cases of fever to be diagnosed 24A—Ague (we had to use the numbers given in the Official Nomenclature of Diseases). Ague was as common then as was P.U.O. in later days. The fever statistics must have been very misleading. Microscopes were not officially provided in the equipment of an Indian regimental hospital in the days before the Station Hospital system was introduced into the Indian Army. But I had one of my own, and used it with some enthusiasm. A lot of excitement goes to the first finding of malarial parasites in a blood smear stained by oneself—or *Amœba histolytica* in a fresh specimen; and there was disappointment when one realised how hard malarial parasites were to find, having expected to see them swarming in every smear. So malaria, one found, wasn't so common after all, and in a genuine case one might have to take a number of specimens—on different days, and at different times—before being rewarded with the thrill of discovery. Dust and heat were deterrents—how stains used to dry up in the hot weather! That I couldn't spot what I was out to look for under the microscope was often due to my amateur technique and badly prepared specimens. But it was fun, and looking back forms part of my personal romance—the romance of learning something by oneself. Yet, when all is said and done, it is not usually in our knowledge or accomplishments that we find romance, though that jewel may be wrested from the dry fields of science as is a diamond from a mine. Darwin and many others have done it—and to hosts whose names will never be known science has spelt romance as well as knowledge. But the ordinary man lives by his emotions, and, looking back, I would not exchange the joy I have had all my life from just sitting on a horse—let alone riding him to hounds—for the gift of all tongues and all knowledge.

KING EDWARD'S HOSPITAL FUND FOR LONDON.—A series of talks on problems of the nations will be given in aid of the fund in the halls of City livery companies during October and November. On Oct. 6th in the hall of the Vintners' Company, Upper Thames-street, E.C., Miss Rose Quong will speak on China; on Oct. 26th in the hall of the Goldsmiths' Company, Foster-lane, E.C., Sir Bernard Pares will speak on Russia; on Nov. 10th in the hall of the Clothworkers' Company, Mincing-lane, E.C., the Hon. Frank Pakenham will speak on Eire; and on Nov. 24th in the hall of the Drapers' Company, Throgmorton-street, E.C., Prof. R. W. Seton-Watson will speak on Czechoslovakia. All the lectures are at 5.30, but the halls will be open at 5 P.M., when ticket-holders will be given an opportunity of seeing over the premises and inspecting the company's collection of historical relics. Tickets may be had from the secretary of the fund, 10, Old Jewry, London, E.C.2.

CORRESPONDENCE

TREATMENT OF INFANTILE PARALYSIS BY CONVALESCENT SERUM

To the Editor of THE LANCET

SIR,—In the letter which appeared in your last issue Prof. G. R. Girdlestone raises anew the question of the efficacy of convalescent serum in the treatment of poliomyelitis. He cites the opinion of a distinguished bacteriologist that "there is little doubt that complete finality in the matter has not been achieved" and is evidently convinced himself that in convalescent serum one is in possession of a potent therapeutic agent. Whilst recognising the imprudence of dogmatising on a question such as this, it must be admitted that the evidence in support of this form of therapy is extremely meagre to say the least of it; perhaps I might be allowed briefly to review the relevant facts.

The experimental work of Schultz and Gebhardt (1933, 1934, 1935), Brodie and Elvidge (1934), Lennette and Hudson (1935), Sabin and Olitsky (1937), and S. Flexner (1936), all points to the prolongations of the olfactory cells—the olfactory hairs—as the portal of entry of the virus of poliomyelitis. The virus has been demonstrated in the nasopharynx of human cases and contacts and it seems that this is the natural route of infection, at any rate in the vast majority of cases. The virus is a strict neurotrope and the experiments of Faber and Gebhardt (1933) and Fairbrother and Hurst (1930) point to the axonal route followed by the virus in its passage from the olfactory cells to the anterior horn cells in the cord.

Work with viruses and their antisera has shown that once a virus has invaded a cell it is protected against the action of specific antibody, thus it would appear that poliomyelitis virus is only exposed to the action of specific antibody whilst it is in the nasopharynx prior to its entry into the olfactory cells. One would not therefore expect specific antibody to be able to influence the course of infection once established, and in the experimental disease in monkeys this is what Schultz and Gebhardt have found. Potent antipoliomyelitis serum, both horse and monkey convalescent, failed to influence the infection when given 24 or 48 hours after nasal instillation of the virus.

Turning now to the evidence which has accumulated from the use of convalescent serum in human poliomyelitis, one finds that a great number of cases have been treated in this way but rarely has any attempt been made adequately to control the value of this form of treatment. In saying this I recognise that the clinicians have been concerned primarily with the amelioration of the state of their patients and not with conducting a scientific experiment. But in a disease like poliomyelitis which runs such a variable course and particularly in the evaluation of a form of treatment which is applied in the preparalytic stage (when it is impossible to predict what would happen were the case untreated, unless one controls the efficacy of the procedure by leaving untreated alternate cases) it is difficult, if not impossible, to say whether or not the treatment has had a beneficial influence. In those cases where this method of control has been followed convalescent serum seems to have been without effect. Thus W. A. Park (1932) gives the figures for 927 cases, 519 of which received serum whilst 408 remained untreated in this way; the controls were unselected. The incidence of paralysis in the serum-treated cases was 19·6 per cent., whereas in the control group it was 11·0. Similar findings are recorded by A. E. Fischer (1934). It would seem then that in the human disease, as in experimental poliomyelitis in the monkey, the *evidence from controlled experiments* does not support the view that convalescent serum is an effective therapeutic agent.

It is recognised, of course, that Prof. Girdlestone is quite entitled, not only to use this form of treatment, but to advocate its use should he be of the opinion that it does good. Thousands of cases have now been treated in this way and there is no evidence that it has ever been harmful, but it should be realised that the available evidence does not support the view that convalescent serum has any specific influence on the course of poliomyelitis even when injected in the preparalytic stage of the disease.

I am, Sir, yours faithfully,

London Hospital, Sept. 12th. S. P. BEDSON.

MATERNAL MORTALITY AND MEDICAL EDUCATION

To the Editor of THE LANCET

SIR,—My attention has just been drawn to the letter of Sir Ernest Graham-Little in your issue of Sept. 3rd. Into the question of policy under dispute it would be undesirable for me to enter, but certain statements in regard to L.C.C. maternity figures are so far from correct that they are likely to cause confusion if left unchecked.

(1) The L.C.C. figures (in 1937 a total death-rate of 2·49 per 1000, including emergencies, and a death-rate of 1·66 per 1000 for all *booked* maternity cases, including those dying from all concurrent diseases, such as tuberculosis or heart disease, within four weeks of confinement) can hardly be said to deal with a "relatively restricted" number of cases, as over a third of all births in London now take place in the Council's hospitals. In 1937 19,852 women were confined in L.C.C. hospitals and the numbers are still rising.

(2) It is not the fact that all these women are delivered by "specialists," as all uncomplicated cases are delivered by midwives or by medical students under their supervision.

(3) Sir Ernest Graham-Little adds that the material dealt with by voluntary hospitals delivering women in their own homes by "senior students who are embryo general practitioners is . . . greatly larger and medically less satisfactory than that of the L.C.C. hospitals." In point of fact, during 1935, the last year for which figures are available, 15,280 confinements took place in L.C.C. general hospitals, while the numbers of patients dealt with in their homes by the voluntary hospitals and organisations were as follows:—

Medical students	2513
Midwives with or without pupil midwives ..	5799

Since 1935 the number of confinements in L.C.C. hospitals has risen by over 4000 per annum.

As to the cases in the homes being "less medically satisfactory," this statement would appear even more wide of the mark. All patients attended from voluntary hospitals and the vast majority of those attended antenatally by domiciliary midwives are carefully examined, and practically all abnormal or potentially abnormal are referred to hospital for confinement. Indeed, this very selection is recognised as one of the main purposes of antenatal care. It would surely show a strange lack of judgment if the voluntary hospitals left the worst cases to be delivered on their

districts! It is found that, with few exceptions, the women readily avail themselves of the advice to enter hospital.

The point is of more than local importance and affects other places besides London. The whole controversy between hospital and domiciliary midwifery is vitiated at the outset by a failure to recognise that the more antenatal supervision is practised in a community the more misleading does a crude comparison between the mortality-rates of home and hospital cases become. To an increasing extent the "medically less satisfactory" material is being shepherded into hospitals.

I am, Sir, yours faithfully,

London, Sept. 12th. LETITIA FAIRFIELD.

To the Editor of THE LANCET

SIR,—I feel that Dr. John Elam's letter in to-day's issue of THE LANCET ought not to be allowed to pass without comment. Dr. Elam says: "Sir Ernest (Graham-Little) considers that proper antenatal care is of vital importance, but he feels that this is best left in the hands of a team consisting of the usual medical adviser, the midwife, and the obstetric specialist, *as has been the case in the past*" (italics mine).

What has been the actual case in the past? Speaking generally, the expectant mothers have been herded together in the waiting-room of an antenatal clinic, where the nervous primipara has had the lurid obstetrical details of the experienced multipara very fully impressed upon her. From the waiting-room she has been ushered into the examination room where her pelvis has been measured and her abdomen palpated by a medical officer who is a whole-time antenatal specialist and does no practical midwifery. She may have heard mention that she is "on the small side" and a discussion as to whether she is a L.O.A. or a L.O.P. Can she be blamed if she has come to regard her pregnancy as a disease? Eventually she has gone into labour on a Friday and after two days the midwife has sent a request for medical aid to the usual medical adviser marked "uterine inertia" or "prolonged labour." The usual medical adviser who, in all probability, did not know that his patient was pregnant, has left his Sunday recreation and gone along and done his best. If the case in spite of his skilful attention has not progressed satisfactorily he has been blamed. If a successful result has been obtained he has only done his job as was expected of him and he will in due course receive a small fee from the local authority in charge of maternity and child welfare.

I submit, Sir, that to call the above workers a team is a gross misrepresentation of the facts. Sir Ernest Graham-Little and his colleagues in the House are striving to make a team out of this disjointed and wasteful state of affairs and place the expectant mother under the care of her usual medical attendant, whom she knows and trusts and who sees her in the privacy of his consulting-room or her own home and who has at his back the services, if he needs them, of a skilled obstetrician.

Dr. Summerskill, on the other hand, whilst calling for better obstetrical training for the medical student (a very praiseworthy attitude) in the next breath demands the elimination of the general practitioner from midwifery altogether and would send every parturient woman via the antenatal clinic into hospital. Such regimentation, apart from its impracticability, is altogether foreign to the people of these islands and they would not put up with it.

I would ask Dr. Elam whether he has ever traced the beginnings of the "suburban neurosis," with which he is familiar, to the effect of the artificial atmosphere of some antenatal clinics on nervous primiparæ? In conclusion I would say that Sir Ernest and his friends are not resisting the betterment of the training of medical students, as Dr. Elam suggested in his previous letter, but they are approaching it in a more practical manner and their sincerity should not be doubted.

I am, Sir, yours faithfully,

Harrogate, Sept. 10th. TERENCE ROBINSON.

MERCURY TREATMENT AND G.P.I.

To the Editor of THE LANCET

SIR,—It was a considerable shock to read in your annotation that mercury has been accused of responsibility for the development of general paresis and tabes. I am tempted to ask whether the suggestion also applies to primary optic atrophy, and all the other late manifestations of syphilis? I should, myself, at once support Jespersen's view of a sort of "Statute of Limitations" argument, but I should much more certainly argue against the idea because the late manifestations of syphilis have been thought to be associated with certain types of occupation. For instance, tabes was mentioned by Osler, in an early edition of his "Medicine," as being particularly prevalent among the lumbermen of Canada, whose work is especially arduous: and I remember being taught as a student that general paresis occurs, as a rule, among brain workers. Aneurysm is well known to be associated with spasmodic effort, and the only case I can remember of primary optic atrophy occurred in a Nottingham lace-worker, whose husband, a miner, suffered from tabes.

There may be the common ground of syphilis and mercury, but, having in mind the fact that the mercury has been finished with long ago, the argument of these late manifestations might, perhaps, be more satisfactorily explained on the ground that these diseases result from the action of the spirochæte on a system, or organ, subject to continued strain.

As regards the reduction in the number of cases, might it not be considered that the arsenical preparations and other modern forms of treatment are really much more effective in killing off the spirochætes, and that, with the proper use of the invaluable Wassermann reaction, the victim of syphilis may, and often does, live a long and healthy life.

I am, Sir, yours faithfully,

Harley-street, W., Sept. 12th. V. S. HODSON.

PAINFUL CRAMP IN OPERATION STUMP

To the Editor of THE LANCET

SIR,—Would any of your readers inform me if they have experience of cases where subsequent to amputation there remains two years later severe and intensely painful cramp of the stump. The stump is quite healthy and reported excellent in every way by those who have seen it. Since, however, a fall resulting in a hæmatoma, the attacks of cramp have intensified. After a particularly severe attack the stump for some days remains very tender to the touch but not in the region of the scar, which is painless. Any exertion necessitating much movement of the stump is apt to be followed by cramp—otherwise I can give no cause for the onset of these attacks. Any suggestions for relief would be welcome.

I am, Sir, yours faithfully,

Cumberland Mansions, W., Sept. 9th. FRANK ROMER.

CONTROL OF UNDULANT FEVER

To the Editor of THE LANCET

SIR,—I should like to support Mr. Shaxson's view that the methods necessary for the eradication of the *Brucella abortus* bacilli from a dairy herd are capable of adoption by any progressive farmer. My experience is very similar to his. I, too, am retailing direct from my farm tuberculin-tested Certified milk from a herd which is regularly subjected to the agglutination test for contagious abortion.

I first tested my herd under the supervision of the Royal Veterinary College in 1930. The result showed that 15 per cent. were positive to the agglutination test for contagious abortion, which was considered to be low. This comparatively low reaction was attributed to the fact that I had always been strict in not allowing any cow out of the calving box until she had ceased discharging. The College continued to test all animals of ten months old and over at three-monthly intervals, and any new animals imported into the herd were bought from herds known to be free from contagious abortion, or subject to their passing the agglutination test. I have not had another positive animal since the original 15 per cent. in 1930, which were isolated in a field with double fencing, 6 ft. apart, to prevent their nosing animals in any adjoining field. These were sold off as and when opportunity arose. As the results continued to be so satisfactory, the College advised that the intervals between the tests should be gradually increased, and the herd is now tested every six months. As an indication of the size of the herd—which is run as one unit—I may say that I have just completed my half-yearly tuberculin test of 346 animals.

There is no doubt that if the medical profession would encourage the consumption of tuberculin-tested Certified milk from herds that have passed the agglutination test for contagious abortion the production of such milk would be greatly increased and ultimately all that was needed would be forthcoming.

I am, Sir, yours faithfully,

L. A. FOOT.

White Hill, Berkhamsted, Herts, Sept. 6th.

DIETHYLSTILBŒSTROL

To the Editor of THE LANCET

SIR,—We should be grateful if you would allow us to draw attention to an error in the legend of Fig. 1 on p. 423 of our article on the biological properties of diethylstilbœstrol, which was unfortunately passed over in correcting the proof. The letters A and B should be interchanged. It is of course the curve labelled "B" which shows the inhibiting action of the synthetic œstrogen on the supply of milk to the young rats.

We are, Sir, yours faithfully,

S. J. FOLLEY,
H. M. SCOTT WATSON.

National Institute for Research in Dairying, Shinfield, Sept. 9th.

MEDICAL NEWS

Congress of Military Medicine

The tenth International Congress of Military Medicine and Pharmacy will be held in Washington from May 7th to 15th, 1939, under the presidency of General Charles R. Reynolds, the surgeon-general of the United States Army. The proposed programme includes discussions on: the organisation and function of the medical services in colonial expeditions; probable casualties in war and methods of calculation; practical procedures for anæsthesia and analgesia in war surgery; organisation and function of the military chemico-pharmaceutical service; emergency treatment and primary apparatus for fractures of the jaws in war; technical specialisation of administrative officers in the medical service; oxygen therapy and its practical use with troops on active service. Registration is open to all officers of the medical services of the army, navy, air, and colonial services, National Guard, territorial forces, and public health service, whether active or reserve. Colonel Harold W. Jones of the Army Medical Corps is secretary-general, and the secretarial office is at the Army Medical Library, Washington, D.C.

Royal Sanitary Institute

A meeting of the institute will be held in conjunction with the Welsh branch of the Society of Medical Officers of Health at the Guildhall, Wrexham, on Friday, Sept. 30th, at 5 P.M.

Dr. T. P. Edwards, medical officer of health for Wrexham, will open a discussion on physical fitness in relation to public health.

Tavistock Clinic

Eight lectures on the principles of mental health will be given at the clinic at 6 P.M. on Tuesdays, beginning on Oct. 11th, by Dr. J. A. Hadfield.

Various courses on psychopathology and psychotherapy for medical graduates have been arranged for the coming session. They range from a week-end course (Oct. 1st and 2nd) on marriage problems, to a full year's clinical course for those who intend to practise psychotherapy with a second year to complete the training of intending specialists in this subject. There is also to be a course on the treatment of childhood disorders, open only to those who have had a year's training, and courses of lectures on child psychology, on psycho-physical adaptation, and on the psychoneuroses. The systematic lectures which form part of the clinical courses are open only to practitioners. Courses have moreover been arranged for teachers, educationists, those trained for work with children, and for magistrates. Further particulars about these courses and lectures may be had from the educational secretary of the clinic, Malet-place, London, W.C.1.

Mother and Doctor

The first of twelve talks which will be given under this title will be heard on Friday, Oct. 7th, at 10.45 A.M. The series will deal with the welfare of mother and child, beginning with antenatal care and going on to cover the first months of a baby's life. Most of the series will be in the form of actual conversations between a mother and a doctor.

National Council for Mental Hygiene

The fifth biennial conference on mental health will be held at the Central Hall, Westminster, from Jan. 12th to 14th. Questions for discussion include: Is Our National Intelligence Declining? and Should Mental Treatment be Practised Solely by Doctors? Papers will also be read on the psychological factor in sexual delinquency; the organisation and staffing of out-patient mental treatment clinics; mental hygiene and the press; education and the emotional needs of the child; problems of adolescent instability and of juvenile delinquency; and there will be a group discussion on the place of the social worker in mental health. Further information may be had from the secretary of the council, 76, Chandos House, Palmer-street, London, S.W.1.

COST OF EFFECTIVE IRON THERAPY.—Messrs. John Wyeth and Brother, Limited, referring to Table II on page 552 of the *Lancet* of Sept. 3rd, state that "Plastules Plain contain 5 grains each of ferrous sulphate and the price to the public is 2*s.* 6*d.* for thirty capsules. This amounts therefore to a penny per capsule containing 5 grains so that the daily cost should be 2*d.* and not 4*d.*"

OBITUARY

SIR ROBERT (HENRY) WOODS, M.Ch. Dubl., F.R.C.S.I.

Sir Robert Woods, who died at his home in Ballybrack, co. Dublin, on Sept. 8th, in his seventy-fourth year, had made his name in laryngology before he became one of the most prominent of Dublin's citizens. Born at Tullamore, King's County, son of Christopher Woods, he was educated at Wesley College and Trinity College, Dublin, where he took an honours course in experimental science and graduated in medicine in 1889. After qualification he visited Vienna as travelling prizeman of Trinity College, and confirmed his intention of practising laryngology and otology. His first appointment was to the Richmond Hospital from which he transferred later to Sir Patrick Dun's. Success in his specialty was rapid; he was soon recognised as the leading laryngologist in Ireland and for some time was president of the British Laryngological Association. The special journals were rarely without some contribution from him on points of technique or treatment. He became secretary of the Royal College of Surgeons in Ireland and from 1910 to 1912 was its president. Later he was president of the Irish Medical Association. In 1917 he was invited to stand as an independent for the Dublin University seat in the House of Commons and was successful at his second attempt in the following year, remaining until the University ceased to send a representative. "Woods was no politician," writes our Dublin correspondent, "and made no claim to be such, but he did useful work in Parliament in softening the bitterness which then existed between the two countries, and in a sphere more congenial to him—that of public health—he was instrumental in rendering efficacious the Act for the Inspection of Children which was passed in 1919."

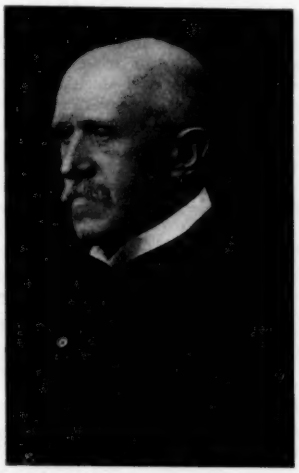
Woods had many qualities to fit him to be the great surgeon he undoubtedly was: a powerful intellect, trained not only in surgery but in the broad principles of physical science, originality of method, and a highly developed technical skill. He was a craftsman not only in surgery but in carpentry, cabinet making, metal work, and modelling. After his partial withdrawal from practice he spent most of his spare time in his workshop. Outside his professional work he had wide interests, mostly artistic and literary. He loved to collect and to make beautiful furniture. He was a connoisseur of painting, and this knowledge led to his appointment as a governor of the National Gallery of Ireland. He was for many years interested in the Royal Zoological Society of Ireland, of which he became president; on his return from a visit to the Far East some years ago he brought back with him a large collection of animals as a gift to the Society, and only a few weeks ago his son, Mr. J. L. Woods, who lives in Malay, sent a consignment of 21 wild animals.

He was also a man of attractive personality, delighting in hospitality and conversation. Writing in the *Irish Times*, an intimate friend says: "Not very talkative himself, he could evoke the best from his guests, intervening sometimes with a whimsical remark or question. He was an ideal travelling companion. He could discover objects of interest everywhere and laugh at discomforts which provoked grumbling from others. He was singularly fair-minded, tolerant of honest opinion however it might differ from his own view. Personal rancour was unknown to him. When a cause appealed to him his generosity was inexhaustible."

In 1894 he married Margaret, daughter of the late James J. Shaw, K.C., Recorder of Belfast. They had two daughters and three sons, of whom the eldest was killed in the late war, and one (Mr. R. R. Woods) is following in his father's steps in Dublin.

WILLMOTT H. EVANS, M.D., B.Sc. Lond., F.R.C.S.

Mr. Willmott Evans died on Sept. 7th at his home in Sidcup in his 80th year. Until an attack of coronary thrombosis four years ago he had lived a life of singular interest and usefulness, and over a long period he was a valued consultant member of THE LANCET staff. On both sides he had medical forbears. His great-grandfather was surgeon to the French prisoners at Plymouth dock. His father, Evan Evans, M.D. Lond., became surgeon in the Navy in 1842, and Willmott Henderson, the third son, was born in 1859 at Beech-street, Barbican, where his father practised after retiring from the Navy. He was educated at University College School, and at University College, where he graduated in science, going on to the medical course at U.C.H., where he qualified with honours in 1885. In 1889 he began his long connexion with the Royal Free Hospital as resident medical officer, becoming surgical registrar two years later and assistant surgeon in 1898. When a dermatological department was opened he was placed in charge of it, specialising in diseases of the skin (on which he wrote a handbook) although never giving up general surgical work. He was joint lecturer on surgery at the London (R.F.H.) School of Medicine for Women, to whose cause he was always a staunch friend. From 1909 to 1933 he was also surgeon to the Blackfriars Hospital for Diseases of the Skin. During the late war he was surgeon to King George Hospital and to the officers' wards at the Royal Free. Retiring from this hospital in 1919 he was appointed consulting surgeon.



In his Erasmus Wilson lecture to the Royal College of Surgeons of England in 1907, Willmott Evans was the first lecturer who fulfilled the founder's request to deal with a dermatological subject, taking leucoderma and analogous changes in the pigmentation of the skin. He restricted himself to the ætiology of this disease and its allies, and it is a good example of his habit of mind that this restricted thesis afforded him ample material for an hour's lecture, setting out in orderly sequence the reasons which led him to doubt the view, then almost unanimously accepted, that leucoderma is a disease of neurotic origin, but rather due to some toxin derived from the alimentary canal and assisted by local injury and the action of

light, the mechanism of its production being the peripatetic tissue cells or macrophages.

He was a man of encyclopædic knowledge. Languages presented no difficulty to him and he early tried his hand on a translation of Nobiling and Jankau's "Handbuch der Prophylaxe." At one time or another he seems to have coached in thirty different subjects. The width of his contacts was illustrated in a popular account of the more recent developments in medicine and surgery, published in 1912 under the title Medical Science of To-day. In this book he brought out the broad facts on which our knowledge of disease is based and the methods by which that knowledge is attained, for it was always his belief that the mainspring of the opposition to hygienic measures lay rather in lack of knowledge than in any lack of interest or purpose, and he looked forward to the coöperation of States one with another in the defeat of disease and the victory of health. In 1923, after his retirement from active practice, he brought out a large book on "Diseases of the Breast," for the most part a record of his personal experience, but also containing a painstaking and critical study of the work of others. In certain directions his views differed from current teaching. He was inclined to ascribe chronic interstitial mastitis to some form of autotoxæmia, and he believed in removing the supraclavicular glands in the complete operation for carcinoma. This book was lavishly illustrated.

Mr. Willmott Evans married in 1895 Ann Frances, daughter of the Rev. George Piercy, a pioneer Methodist missionary of Canton, China. Herself a London medical graduate, she gave up practice on her marriage. They had three sons, of whom two are in South Africa and the third H.B.M. Consul at Palma de Mallorca, and two daughters, one of whom is in general practice at Dukinfield, Cheshire.

INFECTIOUS DISEASE

IN ENGLAND AND WALES DURING THE WEEK ENDED SEPT. 3RD, 1938

Notifications.—The following cases of infectious disease were notified during the week: Small-pox, 0; scarlet fever, 1391 (last week, 1225); diphtheria, 1130; enteric fever, 32 (70 "expected"); pneumonia (primary or influenzal), 279; puerperal pyrexia, 152; cerebro-spinal fever, 17; acute poliomyelitis, 73; acute polio-encephalitis, 9; encephalitis lethargica, 4; dysentery, 46; ophthalmia neonatorum, 90. No case of cholera, plague, or typhus fever was notified during the week.

The incidence of poliomyelitis is almost stationary, the total of poliomyelitis and polio-encephalitis cases combined being 82, 76, 83, 87, 63, 41, 29 for this and the previous six weeks (working backwards).

The number of cases in the Infectious Hospitals of the London County Council on Sept. 9th was 2478, which included: Scarlet fever, 482; diphtheria, 908 (carriers, 27); measles, 84; whooping-cough, 247; puerperal fever, 13 mothers (plus 7 babies); encephalitis lethargica, 274; poliomyelitis 20. At St. Margaret's Hospital there were 24 babies (plus 11 mothers) with ophthalmia neonatorum.

Deaths.—In 126 great towns, including London, there was no death from small-pox, 2 (0) from enteric fever, 4 (1) from measles, 1 (0) from scarlet fever, 5 (0) from whooping-cough, 19 (7) from diphtheria, 50 (12) from diarrhœa and enteritis under two years, and 10 (2) from influenza. The figures in parentheses are those for London itself.

Thurrock and Liverpool again reported the only cases of typhoid. Two deaths from whooping-cough again occurred at Liverpool. Fatal cases of diphtheria were scattered over 13 great towns, no more than 1 at each. Birmingham had 6 deaths from diarrhœa, Portsmouth and Liverpool each 4.

The number of stillbirths notified during the week was 283 (corresponding to a rate of 42 per 1000 total births), including 47 in London.

Medical Diary

Sept. 19th to Sept. 25th

LECTURES, ADDRESSES, DEMONSTRATIONS, &c.

FELLOWSHIP OF MEDICINE AND POST-GRADUATE MEDICAL ASSOCIATION, 1, Wimpole-street, W.

MONDAY to SUNDAY.—WEST END HOSPITAL FOR NERVOUS DISEASES, Welbeck-street, W., M.R.C.P. afternoon course in neurology.—PHYSIOLOGY LECTURES FOR PRIMARY F.R.C.S., Mon., Wed., and Fri., at 5.30 P.M.—BROMPTON HOSPITAL, S.W., Tues. and Fri., 5.15 P.M., M.R.C.P. course in chest diseases.—NATIONAL TEMPERANCE HOSPITAL, Hampstead-road, N.W., Tues. and Thurs., 8 P.M., clinical and pathological M.R.C.P. course.—ROYAL CHEST HOSPITAL, City-road, E.C., Mon., Wed., and Fri., 8 P.M., course in chest and heart disease (open to non-members).—ROYAL WESTMINSTER OPHTHALMIC HOSPITAL, High Holborn, W.C., Sat. and Sun., course in ophthalmology.

MANCHESTER ROYAL INFIRMARY.

FRIDAY.—4.15 P.M., Mr. H. H. Rayner: Surgical cases.

UNIVERSITY OF GLASGOW.

TUESDAY.—4.30 P.M. (Tennent Memorial Building, Church-street), Dr. John Marshall: Cataract.

Appointments

CASS, EMILY E., M.B. Lond., Hon. Ophthalmic Surgeon to the New Sussex Hospital for Women and Children, Brighton.

CLARKE, ROY, M.R.C.P., Medical Superintendent at the Dudley-road Hospital, Birmingham.

EDWARDS, F. R., M.S. Liverp., F.R.C.S., Hon. Assistant Surgeon to the Royal Albert Edward Infirmary and Dispensary, Wigan.

GOLIGHER, J. C., M.B. Edin., F.R.C.S., Resident Surgical Officer, Salford Royal Hospital.

HOTSON, CHRISTOPHER, M.B. Edin., F.R.C.S.E., Senior Assistant Medical Officer (Grade II) at St. Charles' Hospital (L.C.C.).

IREDALE, J. L., M.B. Leeds, D.P.H., County Bacteriologist and Pathologist for Derbyshire.

LIPWORTH, EDWARD, M.B. Witwatersrand, F.R.C.S.E., Resident Medical and Surgical Officer and Registrar at the Royal Albert Edward Infirmary and Dispensary, Wigan.

MENZIES, DUNCAN, L.M.S.S.A., D.M.R.E., Radiologist to the Salford Royal Hospital.

PILE, G. R., M.B. Edin., Additional Assistant Medical Officer for Lancashire.

POWELL, MYRTILLA B., M.R.C.S., Hon. Ophthalmic Surgeon to the New Sussex Hospital for Women and Children, Brighton.

Colonial Service.—The following appointments and promotions are announced:—

COLL, A. C. E., M.B., Medical Officer, Tanganyika Territory;
HUNTER, J. K., M.B. Glasg., Medical Officer, Uganda;
KEITH, E. A., M.B. St. And., Medical Officer, Northern Rhodesia;
MACGREGOR, G. A., M.B. Glasg., Medical Officer, Tanganyika Territory;
RANSFORD, O. N., M.B. Lond., Medical Officer, Nyasaland;
YOUNG, A. R. C., M.R.C.S., Medical Officer, Somaliland;
COCHRANE, E., M.D. Glasg., D.P.H., Senior Medical Officer, Grenada, Windward Islands;
FITZMAURICE, H. G., L.R.C.P.E., Senior Medical Officer, Nyasaland;
LIGHTBODY, W. P. H., L.R.C.P.E., D.T.M. & H., D.P.H., Director of Medical Services, Sierra Leone;
TAYLOR, J. A., M.B. Edin., D.T.M. & H., Medical Officer, Grade II, Fiji;
JAIKARAN, L. S., M.R.C.S., Government Medical Officer, British Guiana; and
VIAPREE, F. A., M.B. Edin., Government Medical Officer, British Guiana.

Medical Referee under the Workmen's Compensation Act, 1925: H. W. GABE, O.B.E., F.R.C.S. Edin., of Swansea, for the Aberayron, Cardigan, Carmarthen, Llandovery, Llanelly, Newcastle-in-Emlyn, and Swansea County Court Districts (Circuit No. 31).

Vacancies

For further information refer to the advertisement columns

Aberdeen Royal Infirmary.—Surgical Reg., £200.
Battersea General Hosp., S.W.—Cas. O., at rate of £60.
Bedford County Hosp.—First H.S., £155.
Birmingham City Education Committee.—Asst. School M.O., £500.
Birmingham City Mental Hosp.—Jun. Asst. M.O., £350. Also Deputy Med. Supt., £625.
Birmingham Maternity Hosp.—H.S., at rate of £75.
Birmingham University.—Professorship of Anatomy, £1000.
Boston General Hosp.—Res. M.O., at rate of £150.
Bradford Royal Infirmary.—Two H.P.'s and Five H.S.'s, each at rate of £150.
British Red Cross Society Clinic for Rheumatism, Marylebone-road, W.—Hon. Dermatologist. Also Hon. Neurologist.
Bury St. Edmunds, West Suffolk General Hosp.—H.S. and H.P., at rate of £180 and £150 respectively.
Calcutta, All-India Institute of Hygiene, &c.—Prof. of Malariology and Prof. of Vital Statistics, &c., each Rs. 1200 monthly.
Cambridge, Addenbrooke's Hosp.—H.P., and H.S. to Spec. Depts., each at rate of £130.

Cardiff, Glan Ely Hosp., &c.—Res. M.O., £350. Also Asst. Res. M.O., £200.
Cardiff Royal Infirmary.—Res. M.O., £200.
Central London Throat, Nose, and Ear Hosp., Gray's Inn-road, W.C.—Res. H.S., at rate of £75.
Devonport, Prince of Wales's Hosp.—Sen. H.S., at rate of £130. Also Jun. H.S., at rate of £120.
Dewsbury County Borough.—Asst. M.O.H., &c., £500.
Doncaster Royal Infirmary.—H.P., £150.
Dreadnought Hosp., Greenwich, S.E.—Med. Supt., £250.
Eastbourne, Royal Eye Hosp.—H.S., at rate of £100.
East Ham County Borough.—Asst. M.O.H., £500.
Edgware, Redhill County Hosp.—Res. Cas. M.O., at rate of £350. Also two Jun. Res. Asst. M.O.'s, each at rate of £250.
Evelina Hosp. for Sick Children, Southwark, S.E.—H.P., at rate of £120.
Gloucestershire, South Gloucestershire United Districts.—M.O., £800.
Grosvenor Hosp. for Women, Vincent-square, S.W.—Gynæcological Surgeon. Also Hon. Anæsthetist.
Guildford, Royal Surrey County Hosp.—Hon. Asst. Radiologist. Also Hon. Phys. in charge of Physio-therapy Dept.
Hosp. for Sick Children, Great Ormond-street, W.C.—Out-patient M.O., £150. Also two H.P.'s, two H.S.'s, and three Out-patient Surgical Assts., each £50.
Hosp. of St. John and St. Elizabeth, Grove End-road, N.W.—Res. H.S., at rate of £75.
Hove General Hosp.—Jun. Res. M.O., £120.
Hull Corporation Health Dept.—Asst. M.O.H., £600.
Hull Royal Infirmary.—H.S. to Ophth. and Ear, Nose, and Throat Dept. Also Second H.P., each at rate of £150.
Hull and Sculcoates Dispensary.—M.O., £500.
Hyll Municipal Maternity Home and Infants' Hosp.—Jun. R.M.O., at rate of £100.
Ilford, King George Hosp.—Res. Anæsthetist, at rate of £150. Also Asst. Cas. O. and H.S., at rate of £100.
Indian Medical Service.—European Officers.
Iraq Government.—Ear, Nose, and Throat Specialist, 150 Dinars per mensem.
Kent County Public Health Dept.—Tuberculosis Officer, £750.
King Edward Memorial Hosp., Ealing.—Res. M.O., at rate of £275. Also Consulting Phys. for Dis. of Children.
Liverpool Heart Hosp.—Hon. Asst. Physician.
Liverpool, Mill-road Infirmary.—Deputy Med. Supt., &c., £450.
London County Council.—Asst. M.O.'s, Grade I, £350. Also Grade II, £250.
Manchester, Ancoats Hosp.—Surg. Reg., £50.
Manchester, Monsall Hosp. for Infectious Diseases.—Jun. Res. Asst. M.O., £250.
Manchester, Park Hosp., Davyhulme.—Jun. Res. M.O., £250.
Manchester Royal Eye Hosp.—Out-patient M.O., £200.
Metropolitan Hosp., Kingsland-road, E.—Sen. and Jun. H.P.'s and Sen. and Jun. H.S.'s, each at rate of £100.
Middlesbrough, North Riding Infirmary.—Sen. H.S., £175.
Middlesex County Council.—Res. Asst. M.O.'s, £400.
Newcastle-upon-Tyne, King's College.—Demonstrator in Bacteriology, £300.
Newcastle-upon-Tyne City and County.—Asst. Child Welfare M.O., £500.
Newport, Mon., Royal Gwent Hosp.—Cas. O., at rate of £150.
North Middlesex County Hosp., Silver-street, Edmonton, N.—Three Jun. Asst. Res. M.O.'s., each at rate of £250.
Northwold (North Hackney) School Treatment Centre.—M.O., £66. Dental Anæsthetist, £37 10s. Also Oculist, £80.
Nottingham, Harlow Wood Orthopædic Hosp.—Two H.S.'s, each at rate of £200.
Nottingham Children's Hosp.—Res. H.S., at rate of £150.
Nottingham City Hosp.—Asst. M.O., £350.
Portsmouth, St. Mary's Municipal Hosp.—Jun. Asst. Res. M.O., £250.
Preston, County Mental Hospital, Whittingham.—Dental Surgeon, £500.
Preston Royal Infirmary.—H.S., £150.
Preston, Sharoe Green Hosp.—Jun. Asst. Res. M.O., at rate of £100.
Princess Beatrice Hosp., Earl's Court, S.W.—Res. Surg. O., at rate of £200. Also H.P. and Cas. O. and Cas. O. and Obstet. H.S., each at rate of £110.
Princess Louise Kensington Hosp. for Children, N. Kensington, W.—H.P., at rate of £120–£150. Also Hon. Asst. Physician.
Radium Institute and Mount Vernon Hosp., 1, Riding House-street, W.—H.S., at rate of £150.
Richmond Royal Hosp., Surrey.—Jun. H.S., £100.
Rochdale, Birch Hill Hosp.—Sen. Asst. Res. M.O., £350.
Royal Air Force.—M.O.'s.
Royal Cancer Hosp., Fulham-road, S.W.—Two Asst. Radiologist, each £350.
Royal London Ophthalmic Hosp., City-road, E.C.—Out-patient Officer, £100.
Royal Naval Dental Service.—Dental Officers.
Royal Northern Hosp., Holloway, N.—Tuberculosis Officer, £750.
St. John's Hosp., Lewisham, S.E.—H.P., at rate of £100.
St. Mary's Hosp. for Women and Children, Plaistow, E.—Hon. Anæsthetists.
Scarborough Hosp., Yorkshire.—H.S. and H.P., each at rate of £150.
Sheffield Children's Hosp.—H.S., at rate of £100.
Shrewsbury, Royal Salop Infirmary.—Res. Surg. O., £250.
South-Eastern Hosp. for Children, Sydenham, S.E.—Res. M.O., at rate of £100.
Surrey County Council.—Tuberculosis Officer, £750. Also Asst. M.O., £600.
Tilbury Hosp., Essex.—H.S., at rate of £140.
Weir Hosp., Balham, S.W.—Sen. Res. M.O., £250.
Wellington Hosp., New Zealand.—Med. Reg. and Surg. Reg., each £500.
West Riding of Yorkshire County Council.—Asst. Tuberculosis O. and Asst. Bacteriologist, each £500.
Windsor, King Edward VII Hosp.—H.P., at rate of £120.
Worcestershire County and City Mental Hosp., Powick.—Asst. M.O., £350.

The Chief Inspector of Factories announces vacancies for Examining Factory Surgeons at Tadcaster (York, W.R.), Sandbach (Cheshire), Blaenavon (Monmouth), Ramsgate (Kent), and Aston (Birmingham) (Warwick).

Medical Referee (or Referees) under the Workmen's Compensation Act, 1925, for the Seaham Harbour and Sunderland County Court Districts (Circuit No. 1) and Durham County Court District (Circuit No. 2). Applications should be addressed to the Private Secretary, Home Office, Whitehall, London, S.W.1, before Oct. 4th.

Births, Marriages, and Deaths

BIRTHS

CLARK.—On Sept. 10th, at Northowram, Halifax, Yorkshire, the wife of Dr. Lindsay Clark—a son.
DAVIDSON.—On Sept. 8th, at Farnham, the wife of Major T. W. Davidson, R.A.M.C.—a son.
KEATINGE.—On Sept. 7th, at Compton, the wife of Major L. R. H. Keatinge, R.A.M.C.—a son.

MARRIAGES

HAWES—KNAPE.—On August 1st, at British Consulate-General, Hankow, Dr. E. Brunel Hawes, of Guildford, to Margaret Knape.
ROGERS—ARNOLD.—On Sept. 8th, Dr. Keith Bernard Rogers to Marjorie Diana Arnold.

DEATHS

EVANS.—On Sept. 7th, 1938, at Cranford, Sidcup, Willmott Henderson Evans, M.D., F.R.C.S., aged 79 years, beloved husband of Frances Piercy Evans, M.B.

N.B.—A fee of 7s. 6d. is charged for the insertion of Notices of Births, Marriages, and Deaths.

NURSING DIRECTORY OF LONDON.—The useful directory published by the Central Council for District Nursing is now brought up to date by a small supplement. The directory includes the names of some 20,000 London streets, tenement buildings, blocks of flats and the like, with the postal district and the city or borough in which they lie and the address of their appropriate nursing association. In the preface particulars are given of the various municipal authorities, ambulance services, hospitals and welfare centres. The directory (price 4*s.*) and the supplement (price 1*s.*) may be obtained from P. S. King and Son, Orchard House, Great Smith-street, S.W.1.

WE have received from GLAXO LABORATORIES LTD. a third edition of "The Ostermilk Book," which is well designed to interest without alarming the prospective mother. It provides guidance on matters affecting her own well-being during pregnancy, and tells her much about the routine care of infants and young children. This edition is improved by the omission of emphasis on the disadvantages of modified cow's milk in the sections explaining the merits of dried preparations and by the substitution of a table showing the average rate at which the infant's weight may be expected to increase for the usual table of "average weights" which takes no account of the weight at birth.

THE function of the various sex hormones now available for clinical use are concisely summarised in a "general physiological introduction" to a booklet issued by BRITISH DRUG HOUSES LTD., London, N.1. The four preparations issued by this firm—Œstroform, Progestin B.D.H., Serogan, and Gonan—are described, with details of standardisation and the dosage and mode of administration recommended in specified disorders. The antagonism between the action of the œstrogenic and luteal hormones is well brought out and the indications for prescribing either are supported by full references to medical literature.

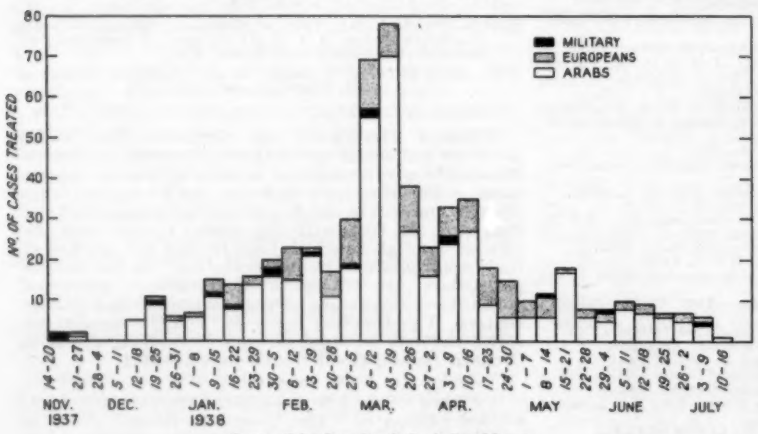
M. & B. 693 (2-sulphanilyl-aminopyridine), which is being used with success in the treatment of pneumococcal and other infections, is now obtainable in containers of 25 tablets and of 100 tablets from Pharmaceutical Specialities (May & Baker), Ltd., Dagenham.

NOTES, COMMENTS, AND ABSTRACTS

TYPHUS IN MOROCCO

THE typhus epidemic in Morocco, which is now at last dying down, can largely be attributed to the wretched condition of the Arab natives following the disastrous famine of 1935–36. The region in the south and the town of Marrakesh have been especially affected, though the trouble quickly spread to Casablanca, where thousands of Arabs flocked in search of food. The further development of the epidemic was checked by the splendid efforts of the French medical service, many members of which, both doctors and nurses, lost their lives in the process.

Great hopes were entertained of compulsory vaccination, which was carried out on a large scale. Police cordons were formed by night round quarters of towns previously marked out, and at daybreak the natives were assembled and led in queues to vaccination centres, no one being allowed to leave the area until he had been vaccinated. Several hundred thousand natives were dealt with in this way. Although the results obtained from this mass-vaccination campaign cannot be considered negligible, they must be accepted with reserve. The present epidemic has confirmed that the most effective preventive measures are those which aim at the suppression of lice, the transmitting agent. Although it is too early yet to say that the epidemic is over the latest official figures from Casablanca (shown in the accompanying Chart) are definitely reassuring.



Cases of typhus treated at Casablanca.

It is of the greatest importance that the epidemic should be completely stamped out before the autumn, when the rhythmic cycle of the disease normally recommences. Unfortunately the task of the medical authorities is complicated by the drought which is now in progress and expected to continue, and as the result of which the wheat and barley harvests will again show a deficit. Every effort is now being made to discover and segregate lice-carriers, and with this object the Casablanca municipality is floating a loan to be used in the demolition of Arab slums in those parts of the town considered to be the principal centres of infection.

THE CLOSING OF HOLLOWAY

IN our issue of August 6th (p. 322) we spoke of the "grim corridors and basements with stone yards into which the sun sometimes shines upon a row of cribs containing infants recently born within the precincts of the prison." The town clerk of Islington writes that the mayor recently went over the prison and formed the opinion that the reference is hardly justified. The creche is not situated in the basement; it is a well-lit room, tastefully decorated, offering accommodation and amenities equal to many private maternity homes, certainly superior to what many of those who are committed to Holloway are able to afford themselves. The mayor was impressed with the very real endeavour of those in control to make the lives of the prisoners reasonably bearable and to secure a hopeful atmosphere in the gaol.

THE PAGET TRADITION

THE story of Sir James Paget will always be worth reading. It is the record of a life in which steady industry and devotion to the work which lay nearest to hand ultimately led to attainment of a position of professional and public esteem unique in our time. In an address reprinted as one of a trilogy [1] Prof. G. Grey Turner details the facts of Paget's life and shows that he owed his prestige to his accuracy, his honesty, and to his power of persuasive eloquence. He was not a great discoverer; it is even open to doubt that he was in the narrower sense of the word a great surgeon, but he was a great gentleman, recognised and honoured as a leader by his contemporaries. In a second address Prof. Grey Turner recalls the life work of his son Stephen, who was of another mould, with the same honesty, accuracy, and steadfastness of purpose, but lacking the presence and the silver voice which distinguished his father. Stephen devoted his energies to the advancement of scientific medicine by his work for liberty in research and freedom from the persecution of fanatics. The third address, delivered at the opening of a winter session of the Welsh National School of Medicine, is a scholarly introduction to the pain and pleasure, the joy and fear, the disappointment and success which await the practitioner of medicine. "None is allowed to walk over the course"; success is attained only by constant and conscious effort; by adherence, in short, to the Paget tradition of honest toil and devotion to the general good.

A NEW JOURNAL FOR NURSES

A BRIGHT cover and a lavish supply of pictures are among the attractions of a new weekly journal entitled *Nursing Illustrated* (2*d.*). The first issue, which appeared on September 9th, contains besides light articles on topics of current interest, simply-written instruction by doctors and nurses on such subjects as acute appendicitis, bandaging, the structure and functions of the skin, and special diets. The first of a series on syringes and needles deals in detail with methods of injection and care of syringes, and is excellently adapted to its purpose. On the other hand, the article on interpretation of radiograms and the section headed Diagnosis from the Face in the first article of "a series of observations which can be made by the nurse" might mislead the nurse into thinking that these problems are simpler than they are. The back of the journal under the general heading "Off Duty" deals with fitness, fashions, make-up, films, short books, knitting, and contains a short story. The journal is excellently produced and is likely to be popular.

[1] The Paget Tradition. By G. Grey Turner. London: Simpkin Marshall. 1938. Pp. 148. 2*s.* 6*d.*